

SAMS

CP19 08973

COMPUTERFACTS™

TECHNICAL SERVICE DATA

STAR® MODEL DELTA-10 PRINTER



FEATURES: COMPLETE SCHEMATICS • PRELIMINARY SERVICE CHECKS • TROUBLESHOOTING TIPS •
EASY-READ WAVEFORMS • REPLACEMENT PARTS LISTS • SEMICONDUCTOR CROSS-REFERENCE

PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of Printer malfunctions.

Check all interconnecting cables for good connection and correct hookup before making service checks.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Scope
Logic Probe

TOOLS

Phillips Scewdriver
Small Screwdriver
Low Voltage Soldering Iron

REPLACEMENT PARTS AND DESCRIPTION

ITEM NO.	PART NO.	DESCRIPTION
F2	09990026	Fuse, 2A @ 125V, Slow Blow
M1	89071000	Print Head
M2	87041030	Carriage Motor
M3	87041040	Paper Feed Motor
M4	87045060	Home Position Detector
SW4	87049050	Right End Detector
SW5	87045070	Paper Out Detector
	87222130	Driver Board
	87222110	Main Control Board
	87222121	Parallel/Serial Interface Board
	87223112	Power Supply Unit

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

MATCH THE NUMBERS ON THE INTERCONNECTING DIAGRAM AND PHOTOS WITH THE NUMBERS ON THE SERVICE CHECKS TO BE PERFORMED.

1

PRINTER DEAD

- (A) If Power LED is not ON, check AC Fuse (F2). If Fuse is open replace and turn Power ON.
- (B) If Fuse F2 opens again, disconnect Connector CN8, replace Fuse and turn power ON. If Fuse opens again, replace Power Supply Unit.
- (C) If Fuse F2 does not open, reconnect Connector CN8, and disconnect Connector CN2B. Turn power ON, if Fuse F2 opens, replace Main Control board.
- (D) If Fuse F2 does not open, reconnect Connector CN2B and turn power ON. If Fuse opens disconnect Connectors CN1B, CN3B, CN4B and CN5B, on Driver board. Replace Fuse F2 and turn Power ON, if Fuse opens replace Driver board.
- (E) If Fuse F2 does not open, reconnect Connector CN3B and turn power ON. If Fuse opens replace Printhead (M1).
- (F) If Fuse F2 does not open, reconnect Connector CN4B and turn power ON. If Fuse opens, check Carriage Motor (M2).
- (G) If Fuse F2 does not open, reconnect Connector CN5B and turn power ON. If Fuse opens, check Paper Feed Motor (M3).
- (H) If Fuse F2 does not open, reconnect Connector CN1B and turn power ON. If Fuse opens, check Home Position Detector (M4), Paper Out Detector (SW5), and Right-End Detector (SW4).

2

PRINTER CARRIAGE ASSEMBLY DOES NOT MOVE

- (A) Check Connector CN4B for good connection.
- (B) Check for 25V at pins 1 and 2 of CN4B. If voltage is missing, replace Driver board.
- (C) Disconnect Connector CN4B and check for 2.4 ohms resistance on each winding of Carriage Motor (M2).
- (D) Check for a shorted Right-End Detector Switch (SW4).

3

PRINT HEAD WILL NOT PRINT

- (A) Check Connector CN3B on Driver board for good connection.
- (B) Check for a defective Head cable board or a cracked Head cable.
- (C) Check for 29.5V at pins 6, 9 and 11 of CN3B. If voltage is missing or low, remove Print head and

check voltage again. If voltage returns, replace print head.

- (D) If the 29.5V is still missing, check voltage at pin 1 of Connector CN2B and check Connector CN2B for good connection.

4

MISSING DOTS IN THE PRINT PATTERN

- (A) Check Connector CN3B for good connection.
- (B) Check for pulses at pins 1 thru 5, 7, 8, 10 and 12 of CN3B while Printer is running self test. If any pulses are missing replace Driver board.
- (C) Check resistance of Print head solenoids.

5

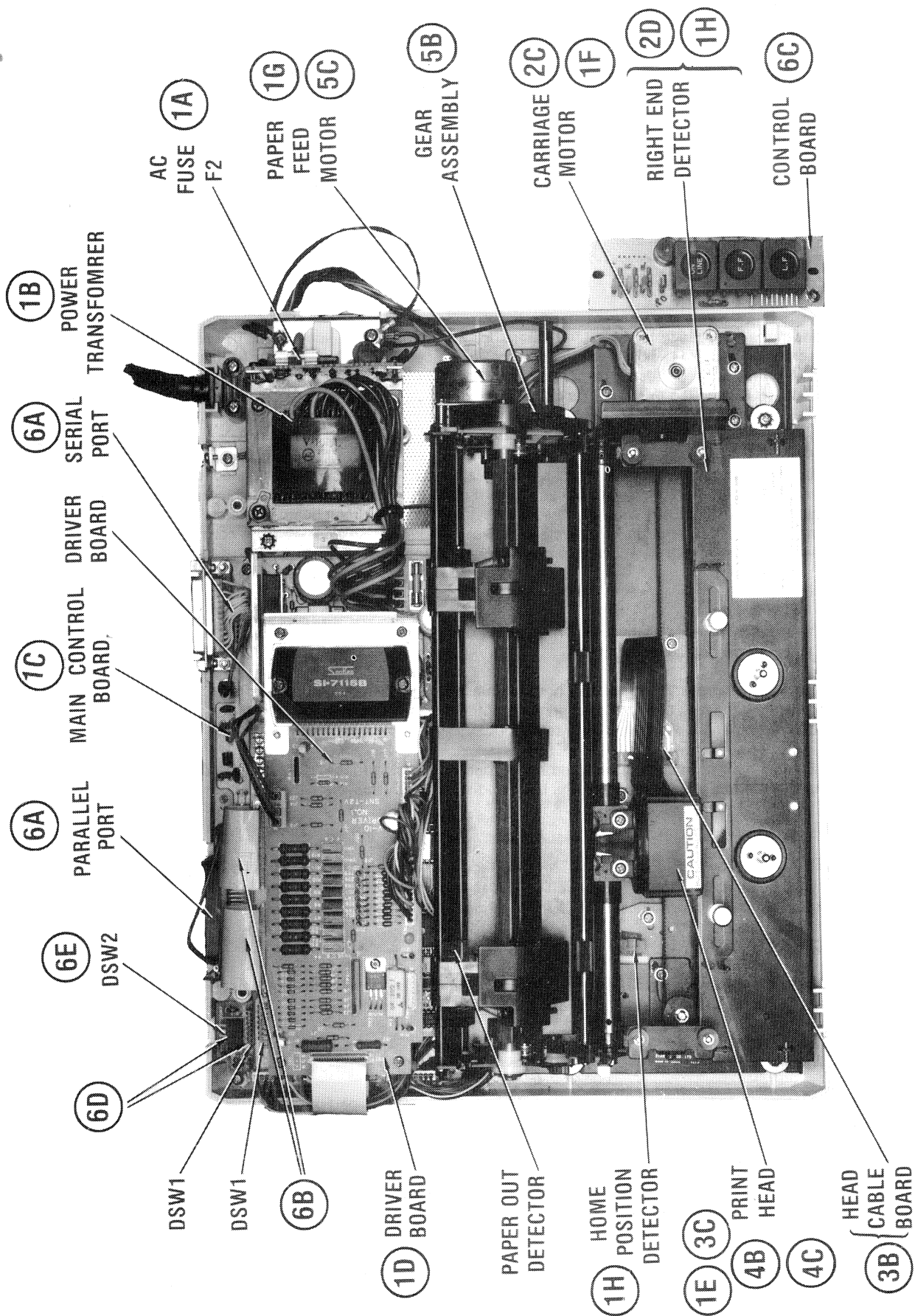
LINE FEED WILL NOT OPERATE

- (A) Check Connector CN5B on Driver board for good connection.
- (B) If Paper Feed Motor (M3) turns and paper does not advance when L.F. button is pressed, check operation of gear assembly on right-hand side of platen.
- (C) If Paper Feed Motor (M3) is inoperative, check resistance of Paper Feed Motor.

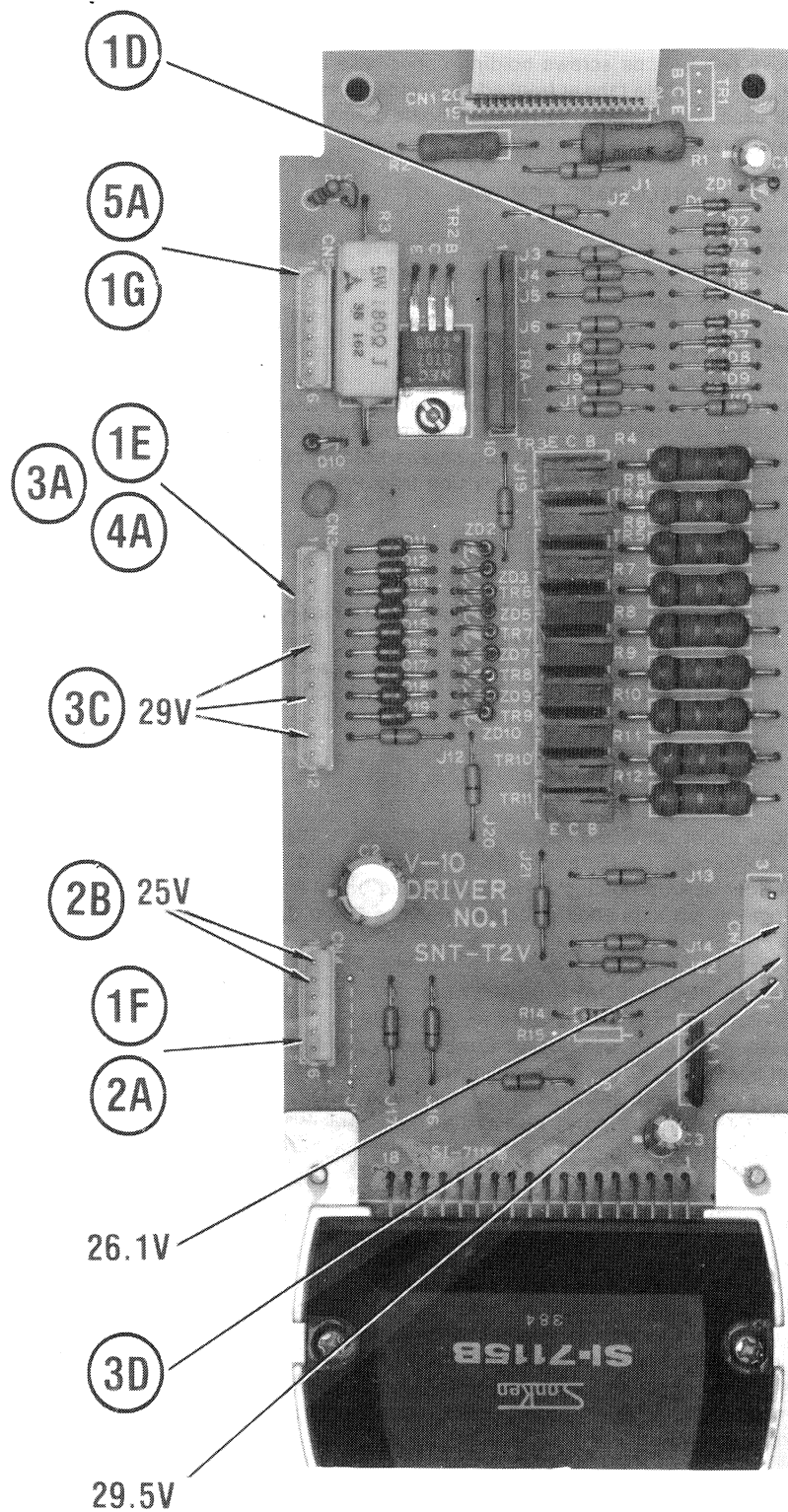
6

PRINTER WILL NOT RECEIVE DATA FROM HOST COMPUTER

- (A) Check interface cable between host Computer and Printer. Check Connector CN1 for Parallel connection, and Connector CN7 for Serial connection.
- (B) Check cable Connector between Connectors CN2 and CN1A, and Connectors CN3 and CN2A for good connection.
- (C) Check operation of On-Line switch. If ON-line status does not change by pressing the ON-line switch, check for a good connection at Connector CN4.
- (D) Check settings of DIP switches DSW1, DSW2 on Main Control board, and DSW1 on Parallel/Serial Interface board.
- (E) If using Serial Port check for right selection of handshaking between host computer and Printer and check settings of Baud Rate on DSW1. Check setting of DSW2-2, it should be set ON for Serial Interface and OFF for Parallel Interface.
- (F) If DIP Switch settings are correct, check Parallel/Serial Interface board by substitution.



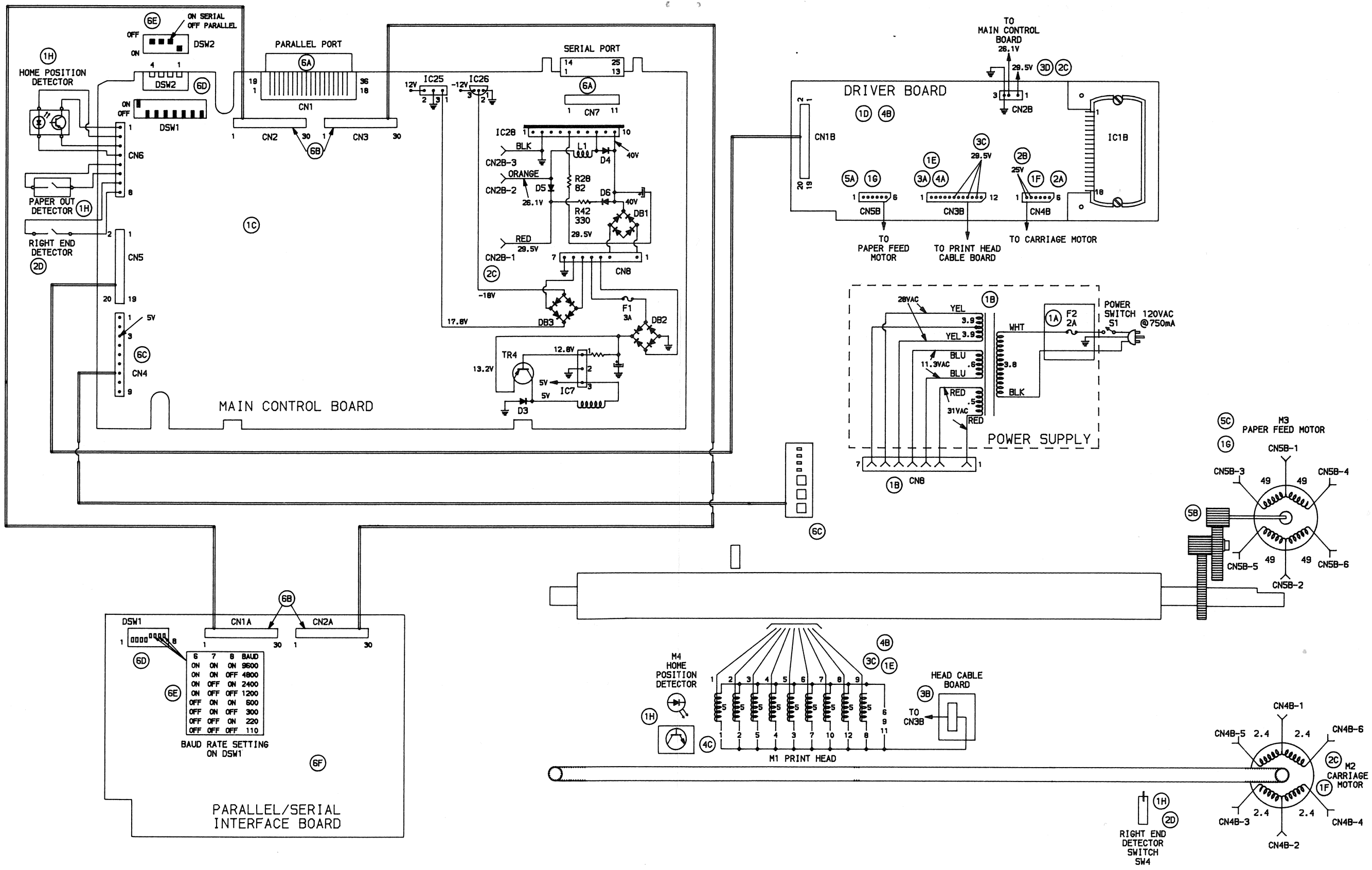
CHASSIS-TOP VIEW



DRIVER BOARD

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PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

INTERCONNECTING DIAGRAM

PRELIMINARY SERVICE CHECKS (Continued)

GENERAL OPERATING INSTRUCTIONS

PRINTER SELF-TEST

To use the built-in self-test function, put paper into the Printer and hold down the LF (Line Feed) button while turning the Printer On.

When the Printer is turned On, it is "On-Line". Pressing the "On-Line" button changes the status of the Printer from "On-Line" to "Off-Line". When the Printer is "On-Line", the Ready light and "On-Line" light will be On. These lights will turn Off when the status of the Printer changes to "Off-Line".

DIP SWITCH SETTINGS

DSW1-1 sets selection of form length. For 11 inch form length set DSW1-1 to ON position. For 12 inch form length set DSW1-1 to OFF position.

DSW1-2 sets selection of print mode. For Normal print mode set DSW1-2 to On. For Emphasized print mode set DSW1-2 to Off.

DSW1-3 sets selection of print pitch. For 10 CPI (character per inch) set DSW1-3 to On position. For 17 CPI (character per inch) set DSW1-3 to Off position.

DSW1-4 sets selection to character set. Standard setting is On. See Character Set Table.

CHARACTER SET TABLE

CHARACTER SET	DSW1-1	DSW1-4
STANDARD ASCII	On	On
DOWN LOAD	On	Off
ITALIC ASCII	Off	On
ITALIC DOWN LOAD	Off	Off

DSW1-5 sets selection of line feed value. For 1/6 inch setting of line feed set DSW1-5 to On position. For 1/8 inch setting of line feed set DSW1-5 to Off position.

DSW1-6, DSW1-7 and DSW1-8 set selection of International Character Set and form length. See International Character Set Table.

INTERNATIONAL CHARACTER SET TABLE

COUNTRY	DSW1-6	DSW1-7	DSW1-8
USA	On	On	On
France	Off	On	On
Germany	On	Off	On
Denmark	On	On	Off
England	Off	Off	On
Sweden	Off	On	Off
Italy	On	Off	Off
Spain	Off	Off	Off

DSW2-1 sets the selection of paper out sensor. If DSW2-1 is set to On position (standard setting), the Printer is disabled when out of paper, and sends the signal to the host Computer to stop sending more information. If DSW2-1 is set to Off position, the Printer is allowed to print without paper in the unit.

DSW2-2 sets the selection of the Serial or Parallel Interface. For Serial Interface set DSW2-2 to ON position. For Parallel Interface set DSW2-2 to OFF position.

DSW2-3 sets the selection of 7 or 8 Bit interface selection. If DSW2-3 is set to On position, interface is set to 7 bits. If DSW2-3 is set to Off position, interface is set to 8 bits (standard setting).

DSW2-4 sets the Printer auto line feed On or Off. If DSW2-4 is set to On position auto line feed is performed by CR code. If DSW2-4 is set to Off position auto line feed is not performed by input of CR code (standard setting).

PARALLEL/SERIAL INTERFACE BOARD

DSW1-1 sets length of data byte, 7 or 8 bit. DSW1-1 is set ON for 7 bits (standard setting). DSW1-1 is set OFF for 8 bits.

DSW1-2 sets Parity selection. DSW1-2 is set to ON position (standard setting). DSW1-2 is set OFF for No Parity check.

DSW1-3 and DSW1-4 set Serial Interface Handshaking.

Handshaking	DSW1-3	DSW1-4
Serial Busy, 1 Byte mode	OFF	OFF
Serial Busy, 1 Block mode	ON	OFF
ACK mode	OFF	ON
XON/XOFF mode	ON	ON

DSW1-5 set Parity condition ODD or EVEN. Set DSW1-5 ON for Odd Parity. Set DSW1-5 OFF for Even Parity.

DSW1-6, DSW1-7 and DSW1-8 set baud Rate for Serial Interface.

Baud Rate	9600	4800	2400	1200	600	300	bit/sec
DSW1-6	ON	ON	ON	ON	OFF	OFF	
DSW1-7	ON	ON	OFF	OFF	ON	ON	
DSW1-8	ON	OFF	ON	OFF	ON	OFF	

PRELIMINARY SERVICE CHECKS (Continued)

MISCELLANEOUS ADJUSTMENTS

PRINT HEAD TO PLATEN GAP ADJUSTMENT

Place the Platen Adjust Lever at the second step position (handle straight up). Insert a feeler gauge between the ribbon guide and the platen. The gap should measure between 0.25mm and 0.35mm. Check the gap with the Print Head at the left, center and right of platen for uniformity.

If the platen gap is out of tolerance, the following adjustment is required.

Move the Platen Adjust Lever all the way forward until adjust bush hole lines up with frame hole. Fasten the left and right adjust bushes with an (M3 × 6) screw into left and right frame tap holes. Remove nut and lock washer holding adjust lever. If the gap is too wide place the adjust lever on point A or B. See Figure 1. If gap is too narrow place the adjust lever on point C or D. See Figure 1. Retighten nut on adjust lever and remove the two retaining screws from tap holes. Check gap measurement.

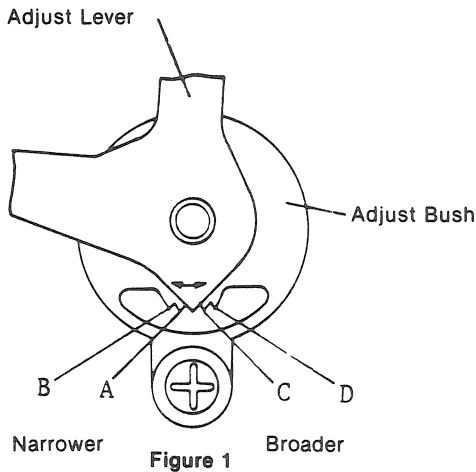


Figure 1

CARRIAGE POSITION ADJUSTMENT (HOME POSITION)

Turn the Printer On. The Carriage will move to the left and stop. Measure the gap between the adjust bush and the Carriage. It should be between 1 and 2mm. See Figure 2. To adjust, loosen the screw on the Home Position Detector Board. Pivot the board either left or right depending if the gap is too wide or too narrow. To check the adjustment turn the Printer On and measure the gap. Repeat the procedure until gap setting is correct.

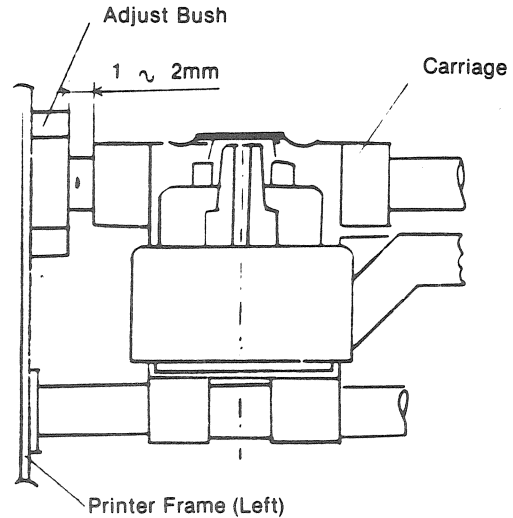


Figure 2

RIGHT-END DETECTOR ADJUSTMENT

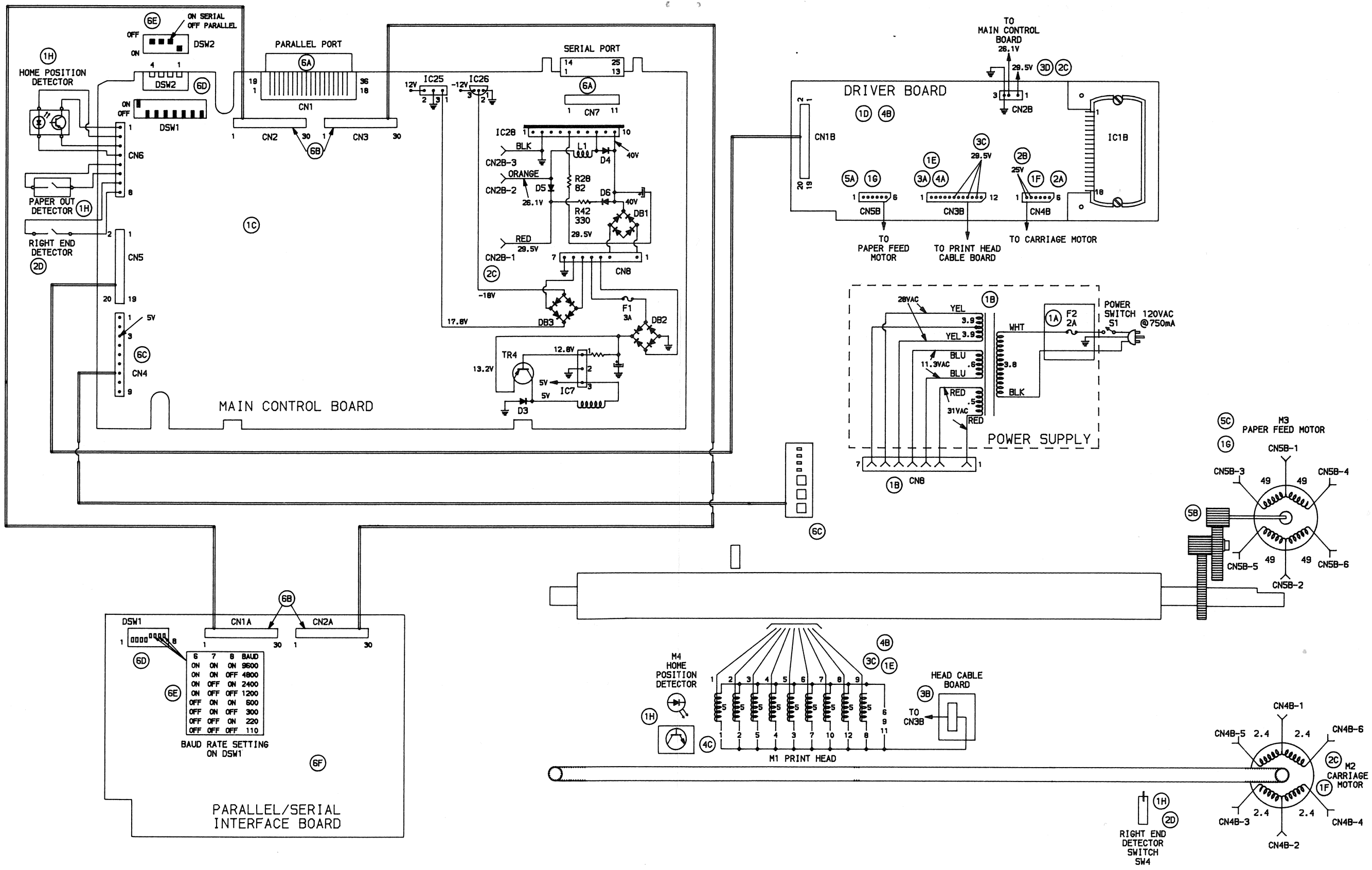
If the Right-End Detector Switch is not closing when the Carriage Assembly is moved to the far right, adjustment is required. Remove the ink ribbon spools. Remove two pins holding Ribbon Base Assembly and remove assembly. Slide Carriage Assembly to far right. Loosen screw in slotted hole of detector switch. Pivot switch until it just closes and tighten screw.

TIMING BELT TENSION ADJUSTMENT

Slide Carriage Assembly to far right. Locate left timing belt pulley Adjusting Plate. Loosen screw in slotted hole of Adjusting Plate. Adjust belt tension for 30 grams \pm 10%. Adjustment is made by pushing the pulley to the left until proper tension is obtained. If adjustment cannot be made within tolerance, replacement of timing belt is required. See Timing Belt Removal. Tighten screw and apply screw lock.

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PRELIMINARY SERVICE CHECKS (Continued)



INTERCONNECTING DIAGRAM

INTERCONNECTING DIAGRAM

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PRELIMINARY SERVICE CHECKS (Continued)

DISASSEMBLY INSTRUCTIONS

UPPER CASE REMOVAL

Remove brown plastic printer cover. Remove platen knob. Remove two phillips screws holding upper case to lower case. Release three tabs at front edge of upper case and lift upper case. Disconnect Control Panel board connector and ground wire. Remove upper case from the Printer.

CONTROL PANEL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove two phillips screws holding Control Panel board to upper case. Remove Control Panel board.

POWER SUPPLY UNIT REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connector to Main Control board. Remove four screws holding Power Supply Unit and two screws holding power cord clamp. Remove Power Supply Unit from Printer.

PRINTER MECHANISM REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connector CN6 from Main Control board and Connectors CN3B, CN4B and CN5B from Driver board. Remove four screws holding Printer mechanism to lower case. Remove ground Connector. Carefully lift printer mechanism from lower case.

DRIVER BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connectors CN1B thru CN5B from Driver board. Remove four screws holding Driver board, two on heat sink and two on left side edge of board. Remove Driver board from Printer.

PARALLEL/SERIAL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove Driver board, see "DRIVER BOARD Removal". Disconnect Connectors CN1A and CN2A from Parallel/Serial board. Remove two spacers and two screws holding board to Main Control board. Remove the Parallel/Serial board from Printer.

MAIN CONTROL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove Driver board, see "DRIVER BOARD Removal". Remove Parallel/Serial board, see "Parallel/Serial Board Removal". Remove four screws holding Main Control board to lower case. Disconnect Power supply Connector and ground Connectors from Main Control board. Lift Main Control board from Printer.

PRELIMINARY SERVICE CHECKS (Continued)

PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to maintain a smoke-free area around the Computer. Do not block cabinet vents of any of the Computer system; Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptible power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If the disk drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long periods of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.



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PRELIMINARY SERVICE CHECKS

ENCLOSED

SAFETY PRECAUTIONS

See page 29.

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Star Micronics Printers are warranted for one year from date of purchase. If any service or modifications are performed during this time by other than Authorized Star Micronics Service Centers, the manufacturers' warranty will be void.

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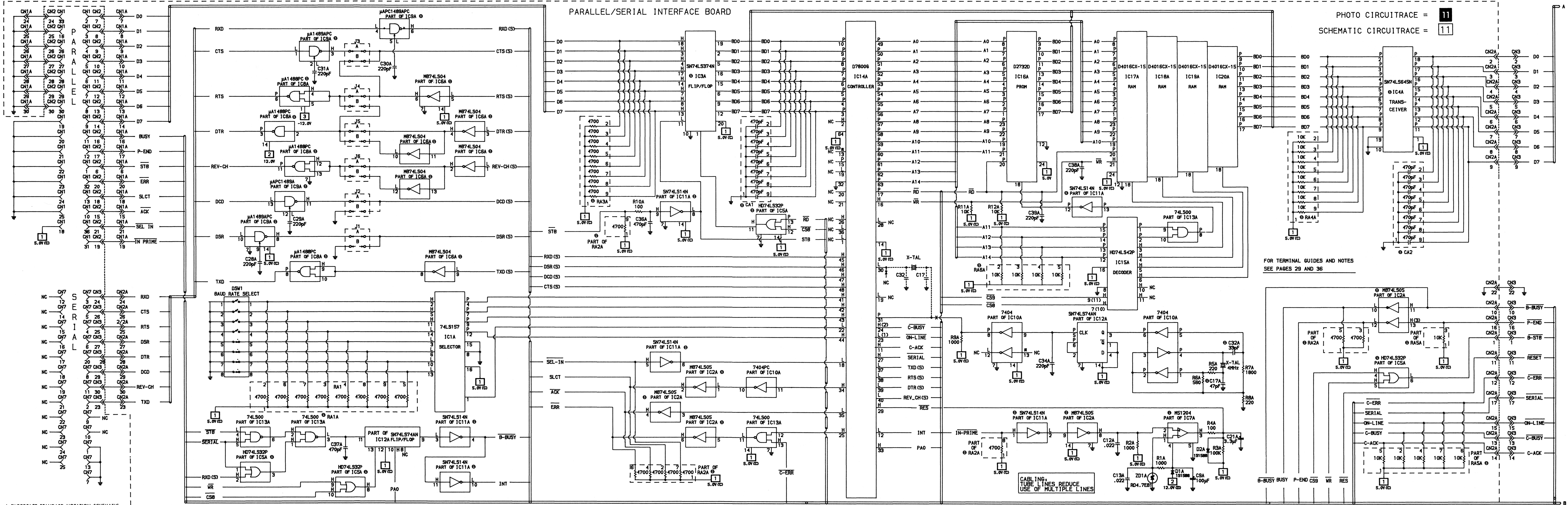
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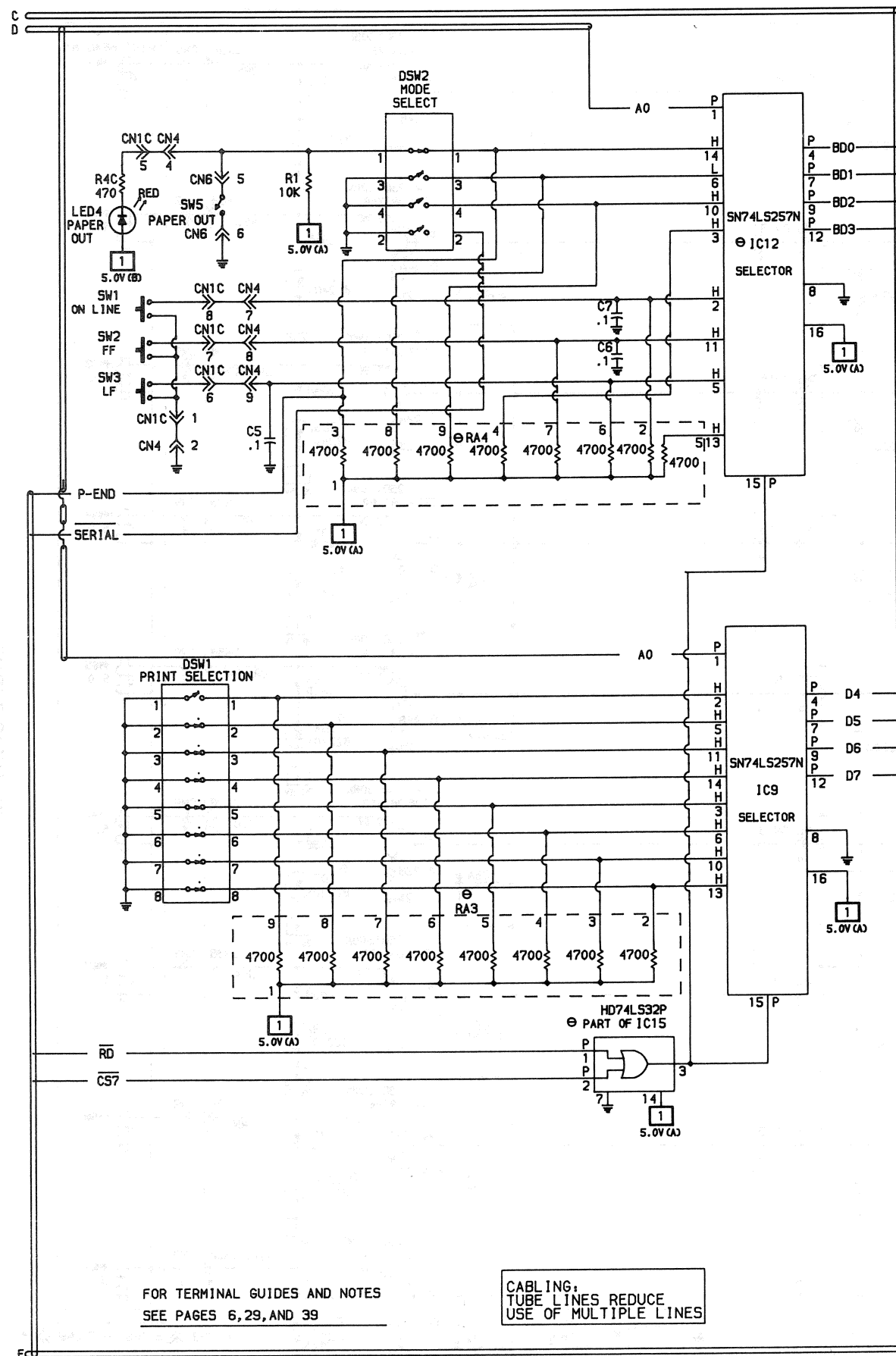
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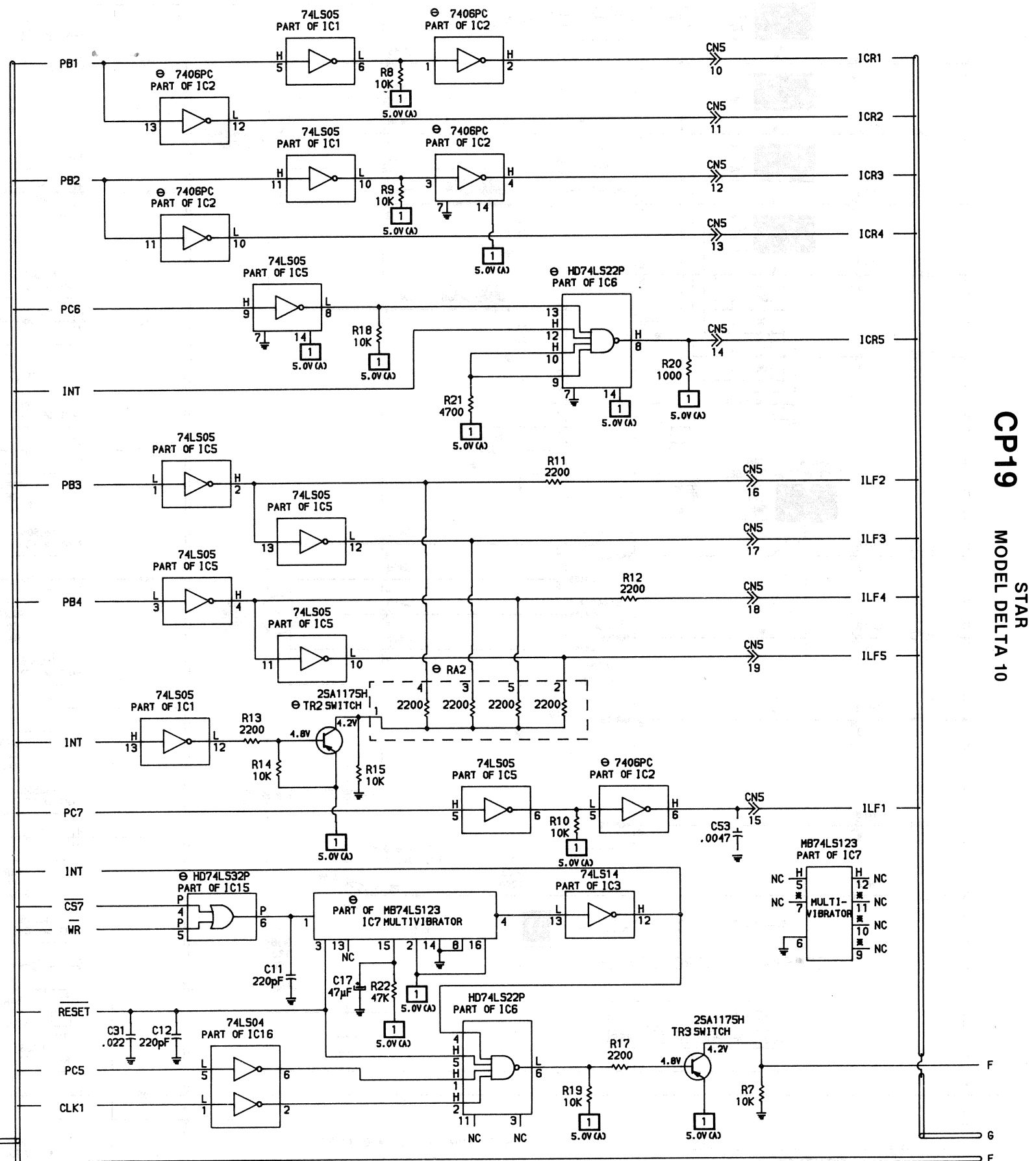


A PHOTOFACT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE™**

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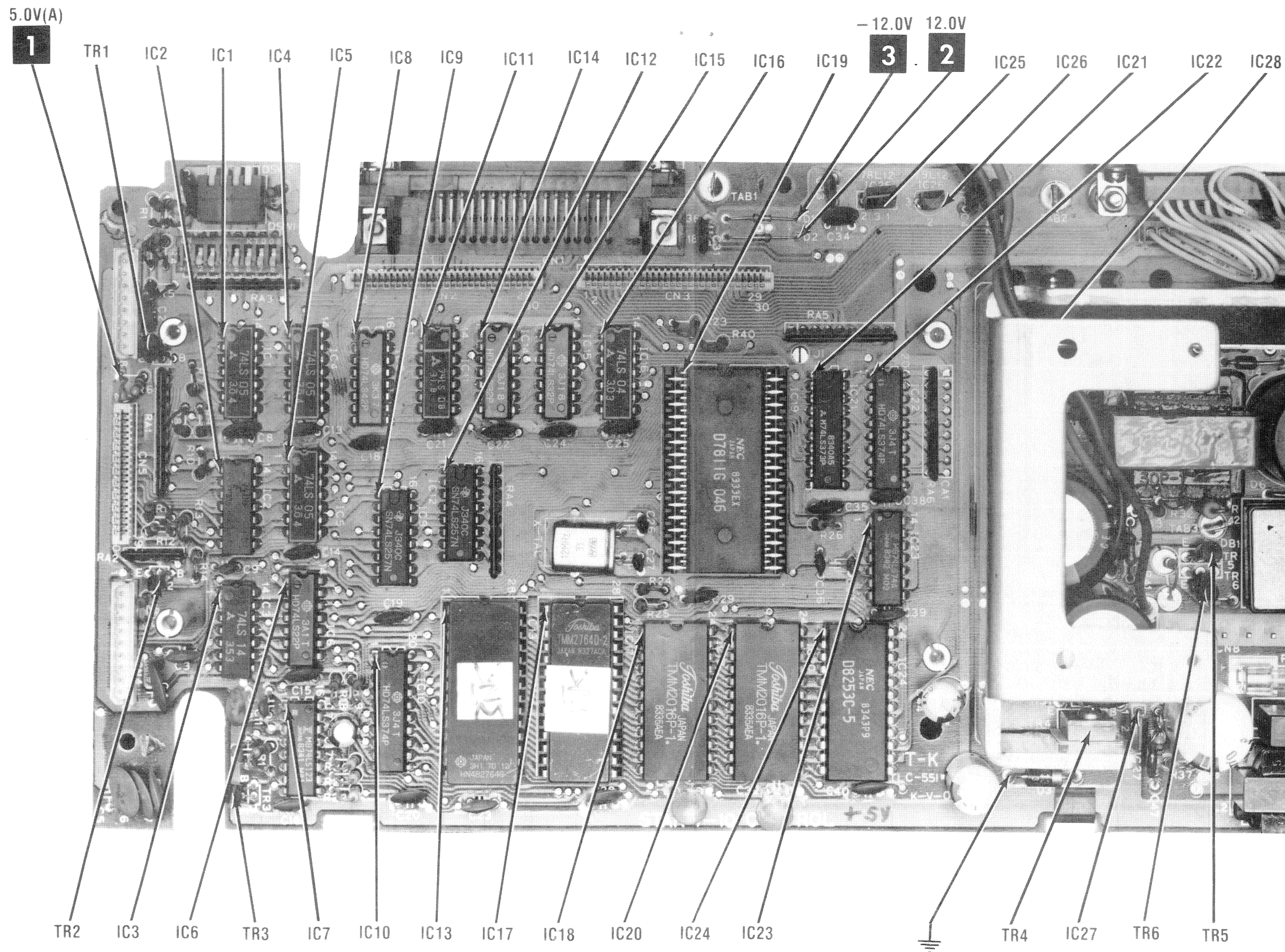
MAIN CONTROL BOARD

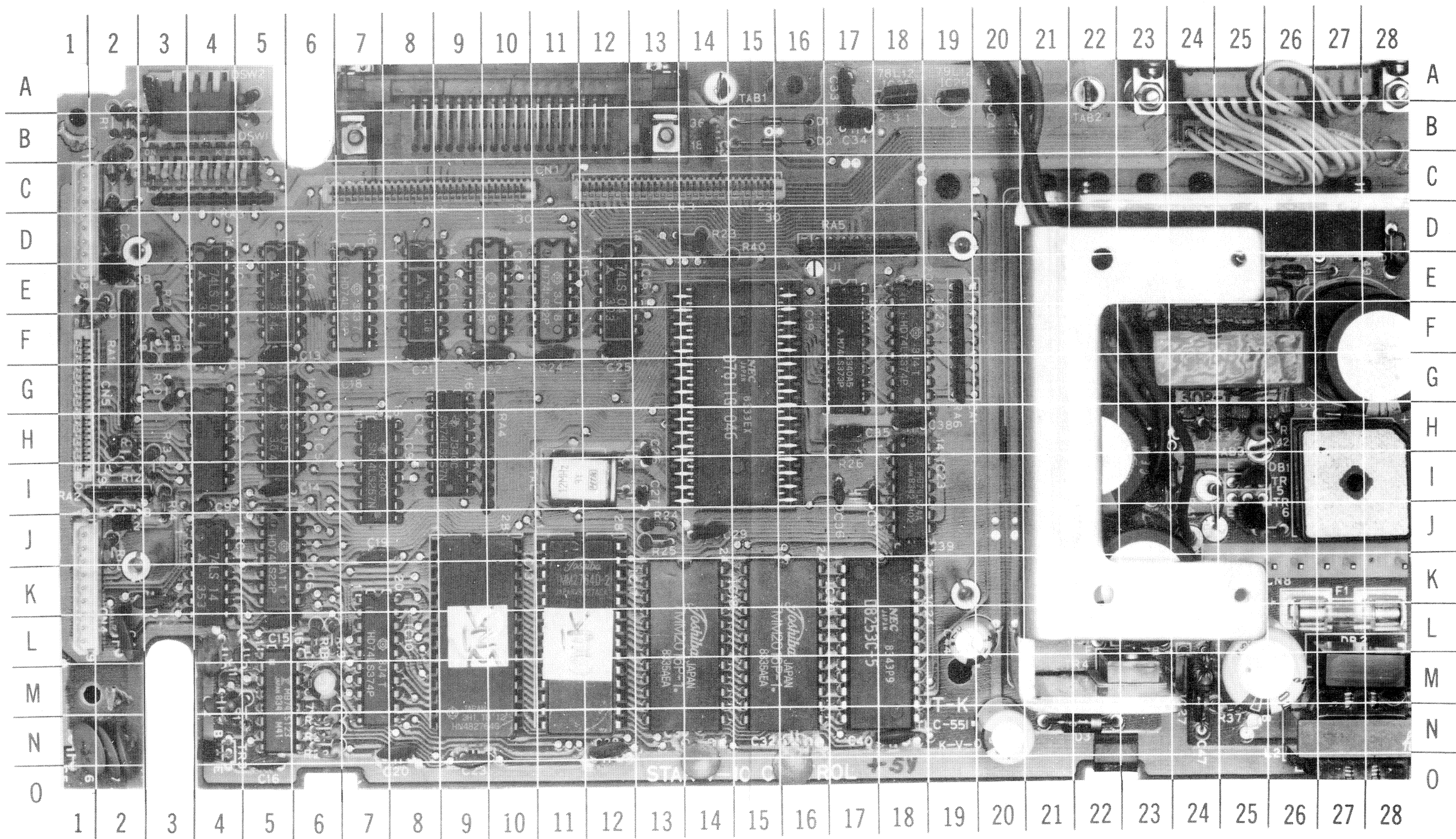


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MAIN CONTROL BOARD







MAIN CONTROL BOARD GridTrace LOCATION GUIDE

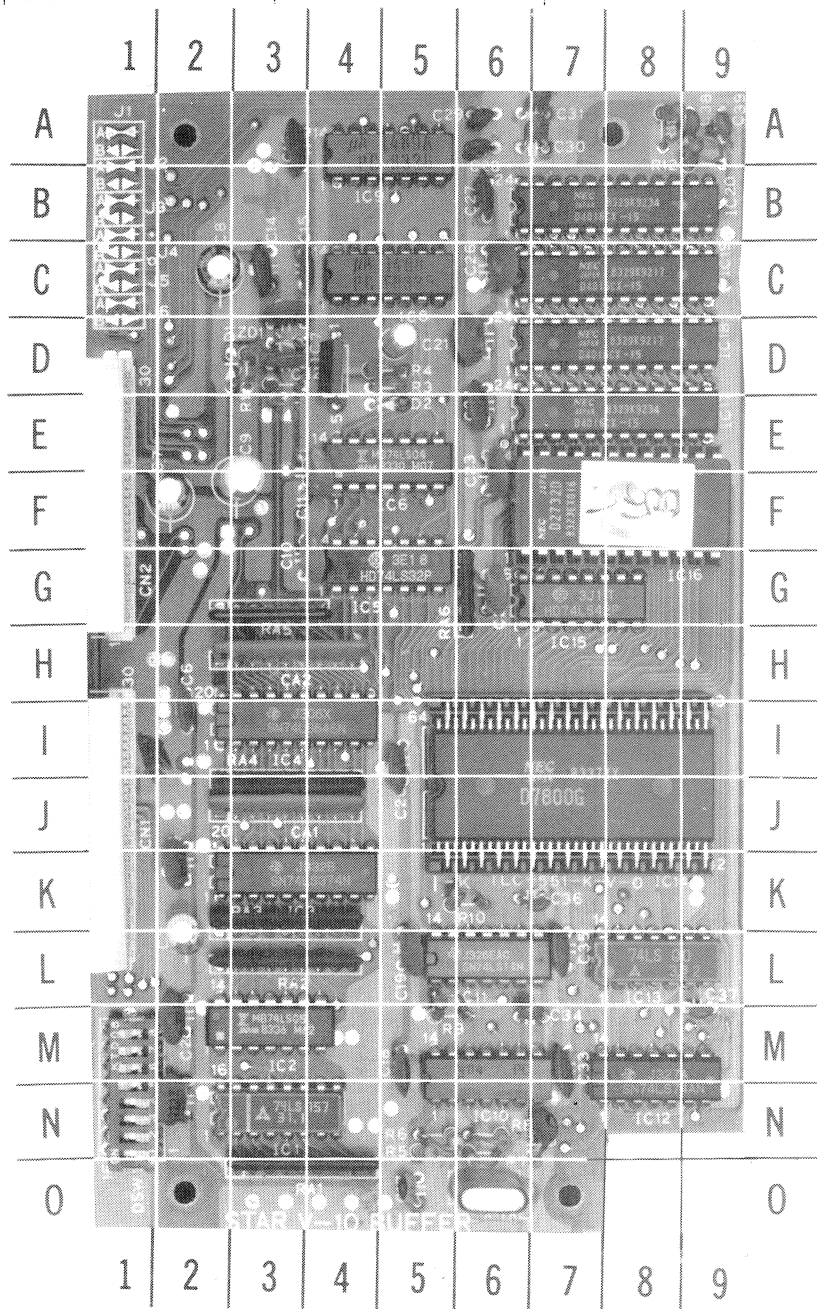
C1	A-3	IC3	K-4	RA4	H-10
C2	D-2	IC4	E-5	RA5	D-17
C3	K-3	IC5	H-5	RA6	F-19
C4	L-2	IC6	K-5	TR1	E-2
C5	N-1	IC7	M-5	TR2	J-2
C6	N-2	IC8	E-7	TR3	N-4
C7	N-2	IC9	I-7	TR4	M-23
C8	F-2	IC10	L-7	TR5	I-25
C9	I-4	IC11	E-8	TR6	J-25
C10	L-4	IC12	H-9	X1	I-11
C11	L-4	IC13	L-9	ZD1	F-23
C12	M-4	IC14	E-10		
C13	F-5	IC15	E-11		
C14	I-5	IC16	E-12		
C15	L-5	IC17	L-11		
C16	N-5	IC18	L-14		
C17	M-6	IC19	G-15		
C18	G-7	IC20	L-16		
C19	J-7	IC21	F-17		
C20	N-8	IC22	F-18		
C21	F-8	IC23	I-18		
C22	F-10	IC24	L-18		
C23	N-0	IC25	A-18		
C24	F-11	IC26	A-19		
C25	F-12	IC27	M-24		
C26	H-13	IC28	D-25		
C27	I-13	L1	F-25		
C28	N-12	L2	N-27		
C29	J-14	R1	B-2		
C30	N-14	R2	B-2		
C31	B-14	R3	B-2		
C32	N-16	R4	B-2		
C33	A-17	R5	C-2		
C34	B-17	R6	E-2		
C35	H-17	R7	E-3		
C36	I-17	R8	F-3		
C37	I-17	R9	F-3		
C38	H-18	R10	G-3		
C39	J-18	R11	H-2		
C40	N-18	R12	I-2		
C41	A-20	R13	H-3		
C42	A-21	R14	I-3		
C43	N-20	R15	J-2		
C44	L-19	R16	A-5		
C45	I-22	R17	M-4		
C46	L-22	R18	L-6		
C47	N-24	R19	L-6		
C48	M-25	R20	N-6		
C49	F-28	R21	N-6		
C50	K-23	R22	N-6		
C51*	C-26	R23	D-14		
C54*	C-23	R24	J-13		
CN1	A-10	R25	J-13		
CN2	C-8	R26	H-17		
CN3	C-13	R27	F-22		
CN4	K-1	R28	G-23		
CN5	G-1	R29	E-23		
CN6	D-1	R30	E-24		
CN7	A-25	R31	L-23		
CN8	K-26	R32	H-25		
D1	B-15	R33	H-24		
D2	B-15	R34	I-24		
D3	N-22	R35	J-25		
D4	E-26	R36	M-24		
D5	I-23	R37	N-25		
D6	H-27	R38	E-26		
DB1	I-27	R39	E-28		
DB2	M-28	R40	D-15		
DB3	K-25	R41	I-24		
DSW1	C-4	R42	H-25		
DSW2	A-4	R46	F-22		
F1	L-27	RA1	F-2		
IC1	E-4	RA2	I-2		
IC2	H-4	RA3	C-4		

* Component located on bottom of board.

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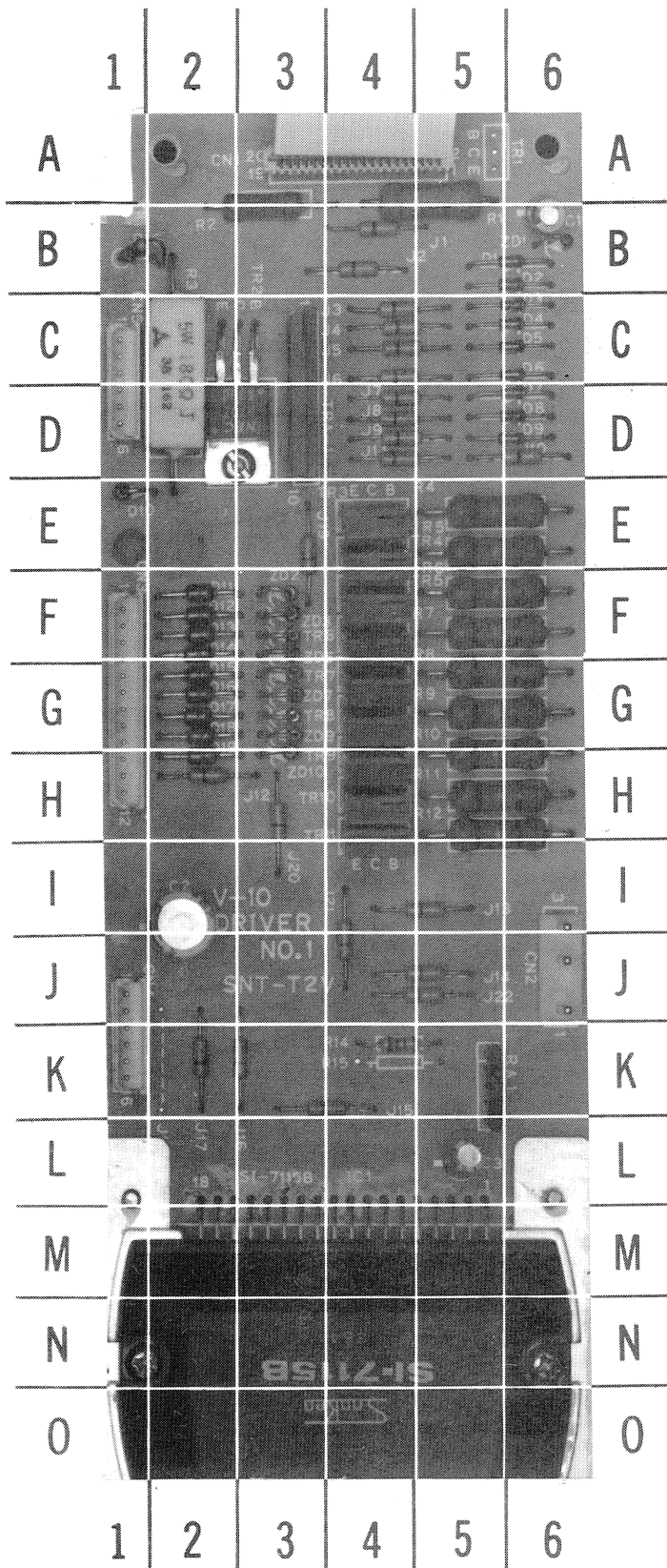
GridTrace LOCATION GUIDE

C1A	N-2	C14A	C-3	C26A	C-6	C38A	A-9
C2A	M-2	C15A	C-3	C27A	B-6	C39A	A-9
C3A	L-2	C16A	A-3	C28A	A-6	CA1	J-3
C4A	K-2	C17A	Q-5	C29A	A-6	CA2	H-3
C6A	I-2	C18A	M-5	C30A	A-7	CN1A	J-1
C7A	F-2	C19A	L-5	C31A	A-7	CN2A	F-1
C8A	C-2	C20A	I-5	C32A	N-7	D1A	D-3
C9A	F-3	C21A	D-5	C33A	M-7	D2A	E-5
C10A	G-4	C22A	G-6	C34A	M-7	DSW1	N-1
C11A	F-4	C23A	F-6	C35A	L-7	IC1A	N-3
C12A	D-3	C24A	E-6	C36A	K-7	IC2A	M-3
C13A	C-3	C25A	D-6	C37A	M-9	IC3A	K-3



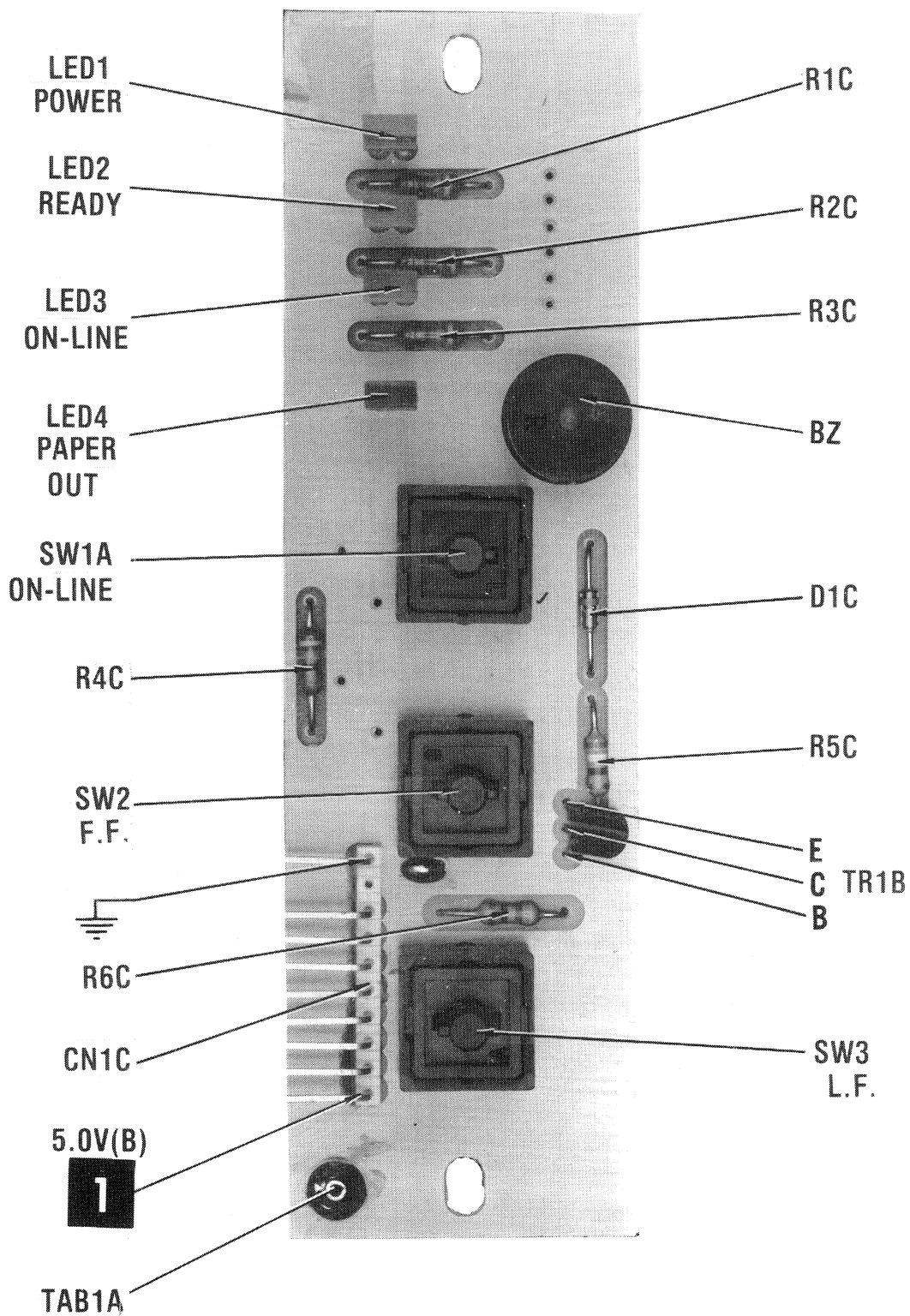
C38A	A-9
C39A	A-9
CA1	J-3
CA2	H-3
CN1A	J-1
CN2A	F-1
D1A	D-3
D2A	E-5
DSW1	N-1
IC1A	N-3
IC2A	M-3
IC3A	K-3
IC4A	I-3
IC5A	G-5
IC6A	E-5
IC7A	D-4
IC8A	C-5
IC9A	A-5
IC10A	M-6
IC11A	L-6
IC12A	M-8
IC13A	L-8
IC14A	J-7
IC15A	G-7
IC16A	F-8
IC17A	E-8
IC18A	D-8
IC19A	C-8
IC20A	B-8
J1A	A-1
J2	B-1
J3	B-1
J4	C-1
J5	C-1
J6	C-1
R1A	D-3
R2A	D-3
R3A	D-5
R4A	D-4
R5A	N-6
R6A	N-6
R7A	N-6
R8A	N-6
R9A	M-5
R10A	K-5
R11A	A-8
R12A	A-9
RA1A	O-3
RA2A	L-3
RA3A	K-3
RA4A	J-3
RA5A	G-3
RA6A	G-6
X-TAL	O-6
ZD1A	D-3

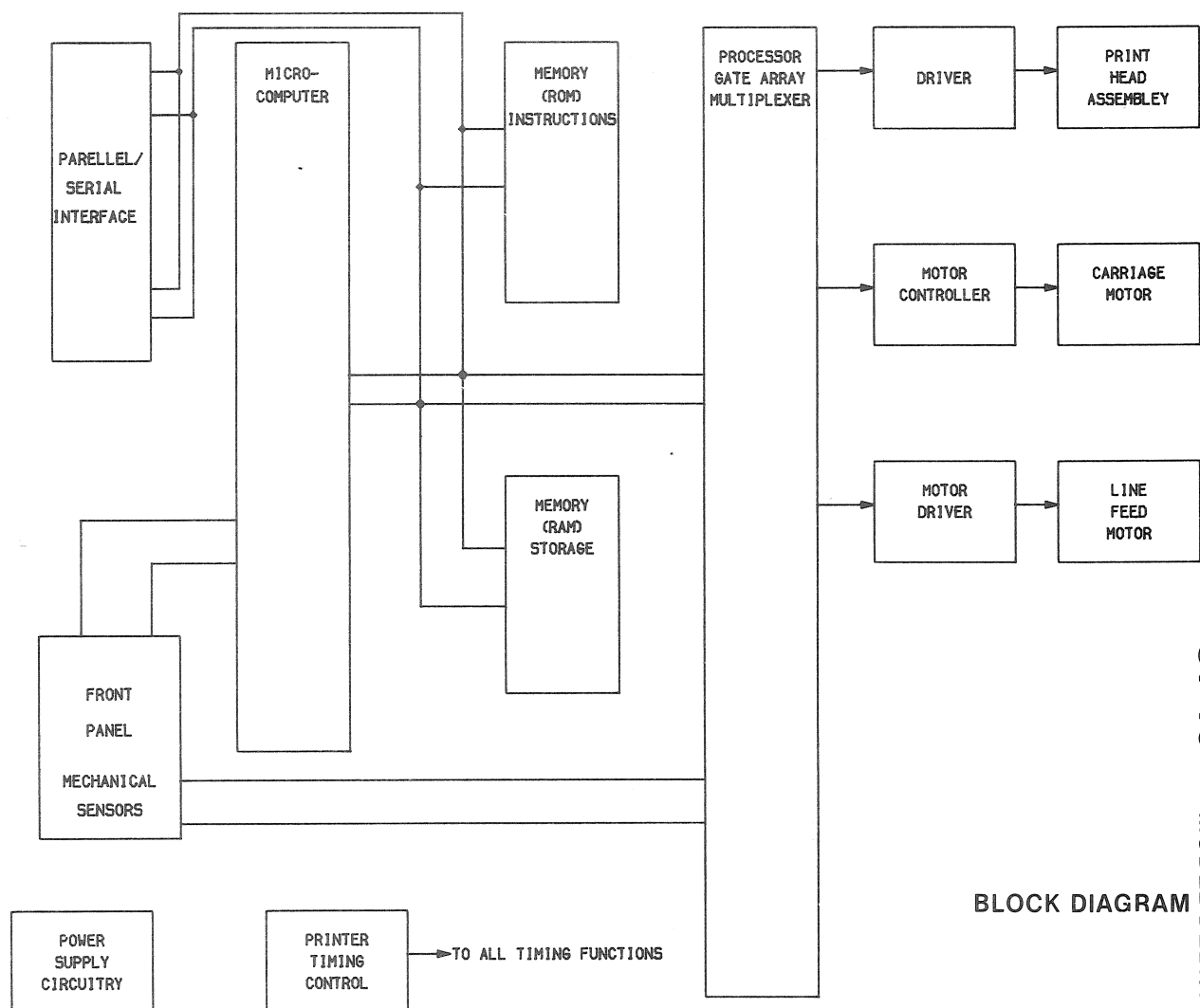
GridTrace LOCATION GUIDE



C1B	B-6
C2B	I-2
C3B	L-5
C4B*	L-4
C5A	M-3
CN1B	A-4
CN2B	J-6
CN3A	G-1
CN4A	K-1
CN5A	C-1
D1B	B-6
D2B	B-6
D3A	C-6
D4A	C-6
D5A	C-6
D6A	C-6
D7	D-6
D8	D-6
D9	D-6
D10	E-1
D11	F-2
D12	F-2
D13	F-2
D14	F-2
D15	G-2
D16	G-2
D17	G-2
D18	G-2
D19	H-2
D20*	L-4
D21*	K-4
D22*	K-2
D23*	L-2
IC1B	N-4
R1B	A-5
R2B	A-3
R3B	C-2
R4B	E-5
R5B	E-5
R6B	F-5
R7B	F-5
R8B	G-5
R9B	G-5
R10B	H-5
R11B	H-5
R12B	H-5
R14B	K-4
R16B	B-1
RA1B	K-5
TR2A	D-3
TR3A	E-4
TR4A	E-4
TR5A	F-5
TR6A	F-5
TR7	G-5
TR8	G-5
TR9	G-5
TR11	I-5
TRA1	D-3
ZD1B	B-6
ZD2	F-3
ZD3	F-3
ZD4	F-3
ZD5	F-3
ZD6	G-3
ZD7	G-3
ZD8	G-3
ZD9	G-3
ZD10	H-3

CP19 **STAR**
MODEL DELTA 10



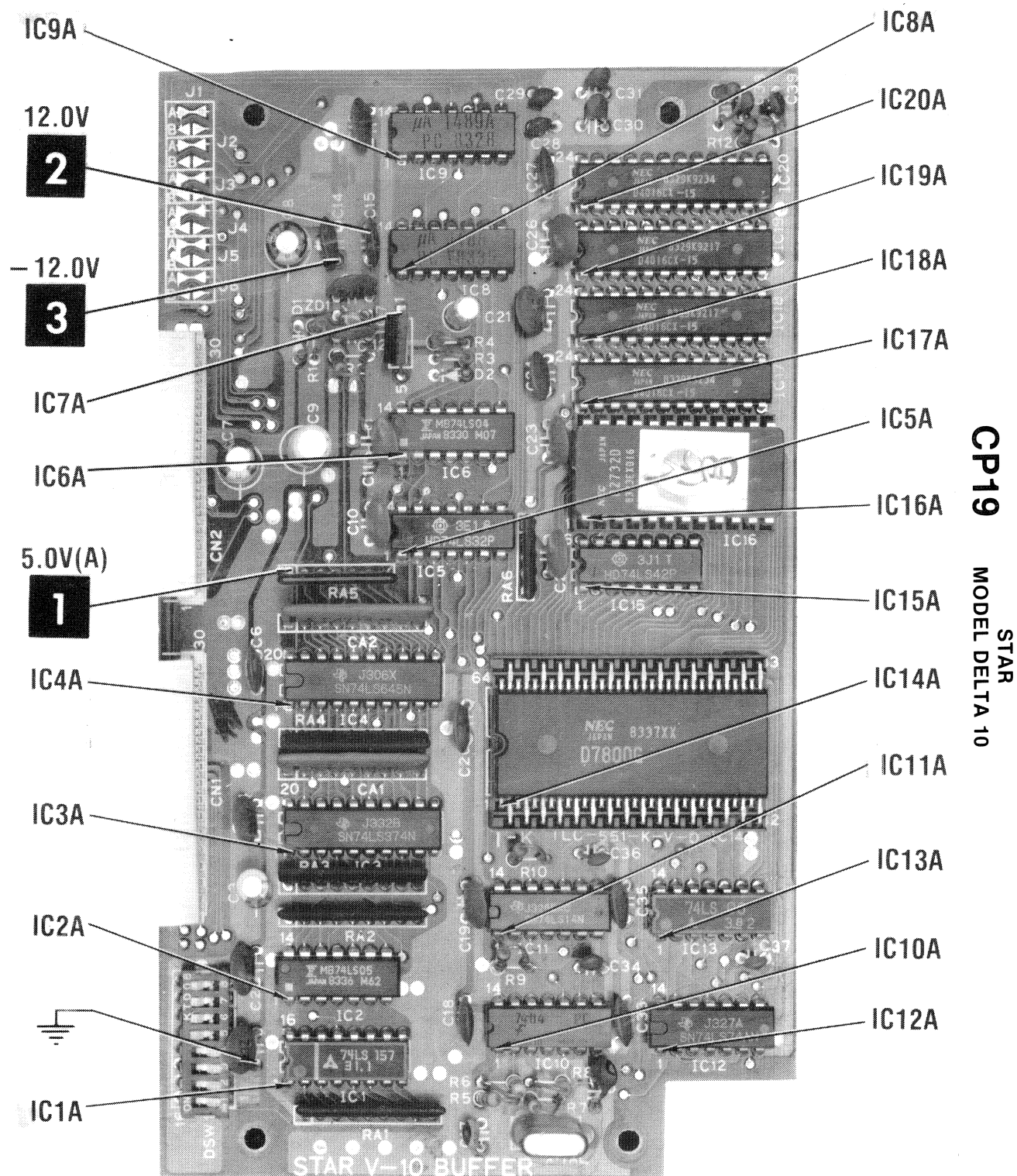


CP19 STAR
MODEL DELTA 10
BLOCK DIAGRAM

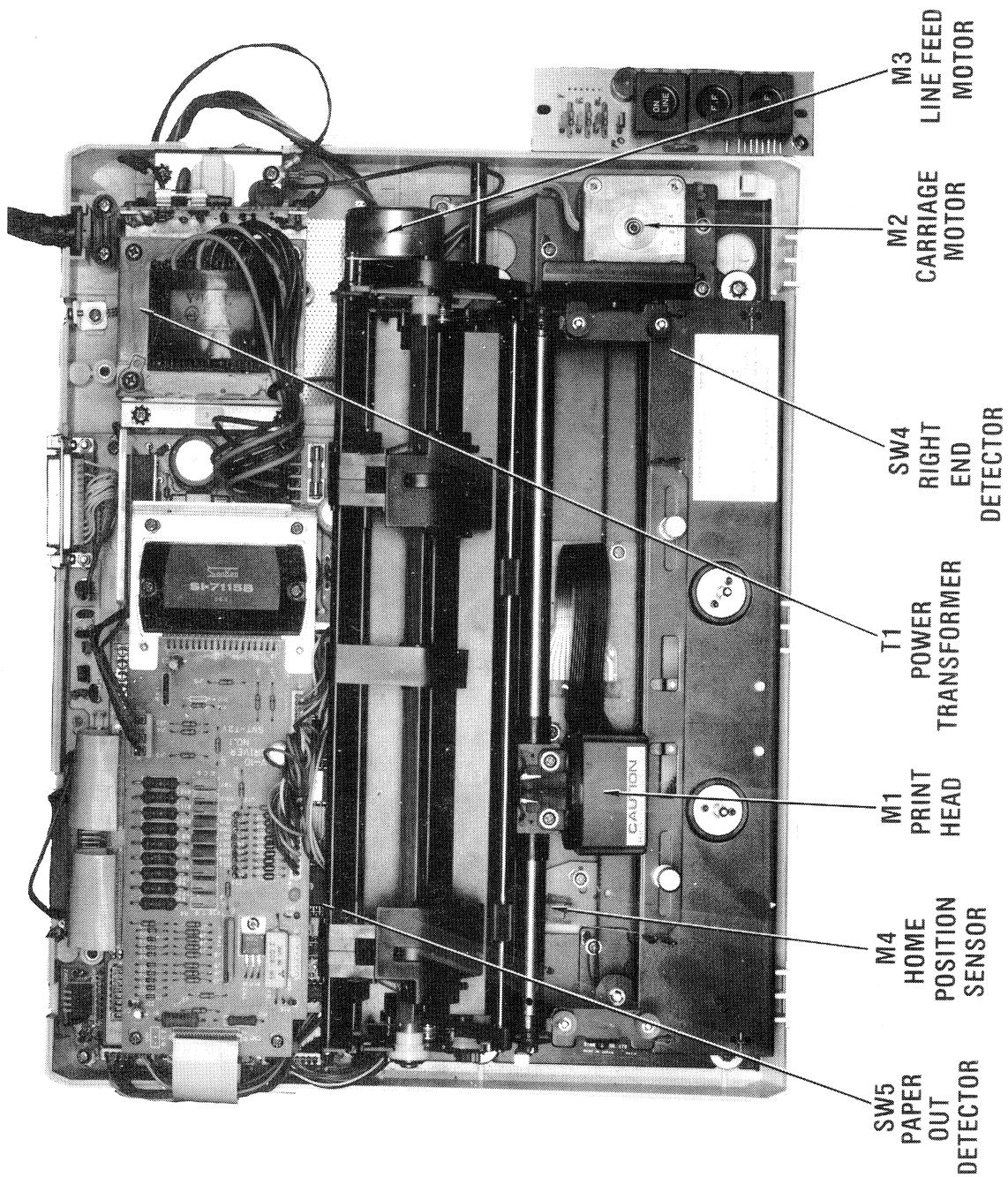


AC INPUT BOARD





NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED



TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

TEST EQUIPMENT (COMPUTERFACTS)

Equipment Name	B & K Precision Equipment No.	Sencore Equipment No.	Simpson Equipment No.
OSCILLOSCOPE	1570A,1590A,1596	SC61	454
LOGIC PROBE	DP51		
LOGIC PULSER	DP101		
DIGITAL VOM	2830	DVM37,DVM56,SC61	463,467,470,474,467E
ANALOG VOM	277		260-7,160,165, 260-6XL,260-7P, 260-6XLP
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	710
COLOR BAR GENERATOR	1211A,1248,1251,1260	CG25,VA62	431
RGB GENERATOR	1260		
FUNCTION GENERATOR	3020		420A,420D
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44	HP200	248 00168,00411,00749
TEMPERATURE PROBE	TP-28		IR-10,00760,00758; 383,389,388
CRT ANALYZER	467,470	CR70	

TROUBLESHOOTING

POWER SUPPLY

Turn ON Printer. If Power Indicator LED (LED1) is OFF and Printer is dead, check for 120VAC across primary winding of Power Transformer (T1). If 120VAC is missing, check AC Fuse (F2) Power Switch (S1) and Line Cord (P1). If 120VAC is present, check for 31VAC between pins 1 and 2, 11.3VAC between pins 3 and 4 and 28VAC between pins 5 and 6 of Connector CN8. If any AC voltages are missing, check Power Transformer (T1).

If AC voltages are present at secondary windings of Power Transformer, check for 13.2V at Cathode of Bridge Rectifier (DB2). If 13.2V is missing, check DB2. Check for 5V at pin 3 of Connector CN4. If 5V is missing, check Regulator Transistor (TR4) and Error Amp IC (IC27).

Check for 40V at Cathode of Bridge Rectifier (DB1). If 40V is missing, check DB1. If 40V is present check for 29.5V at Cathode of Diode D5 and 26.1V at Anode of Diode D5. If 26.1V is not present check voltages and components associated with Regulator IC (IC28).

Check for 17.8V at Cathode of Bridge Rectifier (DB3) and check for -18V at the Anode of DB3. If any voltages are missing, check Bridge Rectifier (DB3). Check for 12V at Cathode of Diode D2. If 12V is missing check Diode D2, Regulator IC (IC25) and associated components. Check for -12.0V at Anode of Diode D1. If -12V is missing check Regulator IC (IC26) and associated components.

If Fuse F1 is open, turn Printer OFF and disconnect Connector CN2. Replace Fuse F1 and turn Printer ON. If Fuse F1 does not open, check Parallel/Serial Interface board.

If Fuse F2 is open, turn OFF Printer. Disconnect Connector CN2B from Driver board. Replace Fuse F2. Turn Printer ON. If Fuse F2 does not open, disconnect red lead from Connector CN2B-1 and reconnect Connector CN2B. Turn Printer ON. Check Fuse F2, if open, check Driver Transistors TR3A, TR4A, TR5A, TR6A, TR7, TR8 and TR9 and Printhead for shorts. If Fuse F2 opens with red lead disconnected from CN2B-1 check Line feed Motor (M3), Carriage Motor (M2), Motor Driver IC (TRA1), Motor Controller (IC1B) and associated components on Driver board.

LINE FEED MOTOR ASSEMBLY DOES NOT MOVE

Check for 26.1V at Emitter of Switch Transistor (TR2A) on Driver board. If 26.1V is missing, check Connector CN2B for good connection, check voltages and components associated with Regulator IC (IC28). If 26.1V is present, check TRA1. Check Line Feed Motor (M3), check for 49 Ohms between pin 1 and pins 3 and 4, and between pin 2 and pins 5 and 6 of Connector CN5B. If Line Feed Motor is good, check for pulses at pins 2, 4, 6, and 8 of IC (TRA1). If pulses are present check TRA1 by substitution. If pulses are not present, check for pulses at pins 1 and 3 of IC5, if pulses are present check IC5 by substitution.

CARRIAGE ASSEMBLY DOES NOT MOVE

Check for 26.1V at pin 2 of Connector CN2B. If 26.1V is missing, refer to the "Power Supply" section of this troubleshooting guide. If 26.1V is present, check for pulses at pins 8, 10, 13 and 15 of IC1B while Printer is running in self test mode. If pulses are present check for good connection at Connector CN4B. Check Carriage Motor (M2) windings, check for 2.4 ohms between pin 1 and pins 5 and 6 and pin 2 and pins 3 and 4 of Connector CN4. If Carriage Motor is good, check IC1B by substitution.

TROUBLESHOOTING (Continued)

PRINTER WILL NOT PRINT IN ON-LINE MODE (WILL NOT RECEIVE DATA)

Confirm that the On-Line Switch changes status of Printer. The On-Line and Ready LEDs should turn ON and OFF when the On-Line Switch is pressed. If the ON-Line switch does not operate, check the switch and Connector CN4. If the On-Line switch works normally, check interface cable between Printer and host Computer. Check for good connections between CN2 and CN1A, and between CN3 and CN2A. Also check settings of DIP switches DSW1 and DSW2 on Main Control board and DSW1 on the Parallel/ Serial Interface board.

PRINT HEAD

The Print Head is moving back and forth but is not printing or some dots are missing. Check for about 29.5V at pin 6 of Connector CN3A. If 29.5V is missing, refer to the "Power

Supply" section of this troubleshooting guide. If 29.5V is present at pin 6 of CN3A, check for pulses at the Anode of Diodes D11 thru D19. If pulses are present check Connector CN3A for good connection, also check Print Head by substitution. If pulses are missing, troubleshoot the malfunctioning circuit associated with the missing pulses.

SELF-TEST

Press Power Switch (S1) and the L.F. Switch at the same time. The printer should go into self-test mode and print fourteen lines showing the standard character set of the Printer. If the L.F. button is held down the self-test printout will continue. If the self test does not function properly, check Connector CN4 for good connection. Also check the L.F. Switch on the Control Panel board. Verify that the Paper Out Indicator is OFF and the Paper Out Switch is good. Check Microcomputer IC (IC19) and ROM ICs (IC13 and IC17) by substitution.

DISASSEMBLY INSTRUCTIONS

UPPER CASE REMOVAL

Remove brown plastic printer cover. Remove platen knob. Remove two phillips screws holding upper case to lower case. Release three tabs at front edge of upper case and lift upper case. Disconnect Control Panel board connector and ground wire. Remove upper case from the Printer.

CONTROL PANEL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove two phillips screws holding Control Panel board to upper case. Remove Control Panel board.

POWER SUPPLY UNIT REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connector to Main Control board. Remove four screws holding Power Supply Unit and two screws holding power cord clamp. Remove Power Supply Unit from Printer.

PRINTER MECHANISM REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connector CN6 from Main Control board and Connectors CN3B, CN4B and CN5B from Driver board. Remove four screws holding Printer mechanism to lower case. Remove ground Connector. Carefully lift printer mechanism from lower case.

DRIVER BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Disconnect Connectors CN1B thru CN5B from Driver board. Remove four screws holding Driver board, two on heat sink and two on left side edge of board. Remove Driver board from Printer.

PARALLEL/SERIAL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove Driver board, see "Driver Board Removal". Disconnect Connectors CN1A and CN2A from Parallel/Serial board. Remove two spacers and two screws holding board to Main Control board. Remove the Parallel/Serial board from Printer.

MAIN CONTROL BOARD REMOVAL

Remove upper case, see "Upper Case Removal". Remove Driver board, see "DRIVER BOARD Removal". Remove Parallel/Serial board, see "Parallel/Serial Board Removal". Remove four screws holding Main Control board to lower case. Disconnect Power supply Connector and ground Connectors from Main Control board. Lift Main Control board from Printer.

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
D1	1S1588	08000001	(1)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D1A	1S1588	08000001	(2)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D1B	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D1C	1S1588	08000001	(4)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D2	1S1588	08000001	(1)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D2A	1S1588	08000001	(2)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D2B	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D3	RK13	08030001	(1)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D3A	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D4	W03B	08020025	(1)	NTE116	ECG116	SK3311	WEP156	212-76-02
D4A	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D5	S3V10	08000016	(1)	NTE156	ECG156	SK3051/156	WEP4008/5809	212-29000
D5A	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D6	W03B	08020025	(1)	NTE116	ECG116	SK3311	WEP156	212-76-02
D6A	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D7 thru D9	1S2076A	08000015	(3)	NTE519	ECG519	SK3100/519	WEP925/519	103-131
D10 thru D19	W03B	08020025	(3)	NTE116	ECG116	SK3311	WEP156	212-76-02
D20 thru D23	GP30D GP-300	08000017	(3)	NTE5802 NTE5802	ECG5802 ECG5802	SK9005/5802 SK9005/5802	WEP4002/5802 WEP4002/5802	212-Z9000 212-Z9000
DB1	S10VB10	08990210	(1)	NTE5309	ECG5313	SK5042		
DB2	KBL02	08990202	(1)	NTE166	ECG166	SK9075/166	WEP1051/166	212-Z9001
DB3	S1VB10	08990208	(1)	NTE74LS05	ECG74LS05	SK74LS05		HE-443-818
IC1	74LS05	08210017	(1)	NTE74LS157	ECG74LS157	SK74LS157		HE-443-799
IC1A	74LS157	08210039	(2)					
IC1B	SI-7115B	08200070	(3)	NTE7406	ECG7406	SK7406		HE-443-698
IC2	7406PC		(1)	NTE7406	ECG7406	SK7406		HE-443-698
IC2A	7406 MB74LS05	08210006	(2)	NTE74LS05	ECG74LS05	SK74LS05		HE-443-818
	74LS05	08210017		NTE74LS05	ECG74LS05	SK74LS05		HE-443-818

STAR
CP19 MODEL DELTA 10

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFG. PART No.	REPLACEMENT DATA				
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.
IC3	74LS14	08210023	(1)	NTE74LS14	ECG74LS14	SK74LS14	HE-443-872
IC3A	SN74LS374N	08210052	(2)	NTE74LS374	ECG74LS374		HE-443-863
IC4	74LS374	08210017	(1)	NTE74LS374	ECG74LS374		HE-443-863
	74LS05			NTE74LS05	ECG74LS05	SK74LS05	HE-443-818
IC4A	SN74LS645N		(2)	NTE74LS645	ECG74LS645		
	74LS645	08210050		NTE74LS645	ECG74LS645		
IC5	74LS05	08210017	(1)	NTE74LS05	ECG74LS05	SK74LS05	HE-443-818
IC5A	HD74LS32P		(2)	NTE74LS32	ECG74LS32	SK74LS32	HE-443-875
	74LS32	08210053		NTE74LS32	ECG74LS32	SK74LS32	HE-443-875
IC6	HD74LS22P		(1)	NTE74LS22	ECG74LS22		
	74LS22	08210063		NTE74LS22	ECG74LS22		
IC6A	MB74LS04		(2)	NTE74LS04	ECG74LS04	SK74LS04	HE-443-755
	74LS04	08210002		NTE74LS04	ECG74LS04	SK74LS04	HE-443-755
IC7	MB74LS123		(1)	NTE74LS123	ECG74LS123	SK74LS123	HE-443-942
	74LS123	08210059		NTE74LS123	ECG74LS123	SK74LS123	HE-443-942
IC7A	M51204		(2)	NTE1434	ECG1434	SK7634/1434	
	M51204L	08200040		NTE1434	ECG1434	SK7634/1434	
IC8	HD74LS42P		(1)	NTE74LS42	ECG74LS42	SK74LS42	HE-443-807
	74LS42	08210004		NTE74LS42	ECG74LS42	SK74LS42	HE-443-807
IC8A	uA1488PC		(2)	NTE75188	ECG75188	SK5188/75188	HE-443-794
	75188	08210047		NTE75188	ECG75188	SK5188/75188	HE-443-794
IC9	SN74LS257N		(1)	NTE74LS257	ECG74LS257	SK74LS257	HE-443-802
	74LS257	08210040		NTE74LS257	ECG74LS257	SK74LS257	HE-443-802
IC9A	uA1489APC		(2)	NTE75189	ECG75189	SK5189/75189	HE-443-795
	75189	08210048		NTE75189	ECG75189	SK5189/75189	HE-443-795
IC10	HD74LS374P		(1)	NTE74LS374	ECG74LS374		HE-443-863
	74LS374	08210052		NTE74LS374	ECG74LS374		HE-443-863
IC10A	7404PC		(2)	NTE7404	ECG7404	SK7404	221-Z9076
	74LS00	08210001		NTE74LS00	ECG74LS00	SK74LS00	HE-443-728
IC11	74LS08	08210032	(1)	NTE74LS08	ECG74LS08	SK74LS08	HE-443-780

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFR. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
IC11A	SN74LS14N	08210023	(2)	NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
IC12	74LS14		(1)	NTE74LS14	ECG74LS14	SK74LS14		HE-443-872
	SN74LS257N			NTE74LS257	ECG74LS257	SK74LS257		HE-443-802
	74LS257	08210040	(2)	NTE74LS257	ECG74LS257	SK74LS257		HE-443-802
IC12A	SN74LS74AN	08210033	(2)	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
IC13	74LS74		(1)	NTE74LS74A	ECG74LS74A	SK74LS74A		HE-443-730
IC13A	HN482764G		88901010	(2)	NTE2764(8)	ECG2764(8)		
	74LS00	08210001	(1)	NTE74LS00	ECG74LS00	SK74LS00		HE-443-728
IC14	HD74LS32P	08210053	(1)	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
IC14A	74LS32		(2)	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
	D7800G							
	uPD7801G-176-36	08220048						
IC15	HD74LS32P	08210053	(1)	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
IC15A	74LS32		(2)	NTE74LS32	ECG74LS32	SK74LS32		HE-443-875
	HD74LS42P			NTE74LS42	ECG74LS42	SK74LS42		HE-443-807
IC16	74LS42	08210004	(1)	NTE74LS42	ECG74LS42	SK74LS42		HE-443-807
	74LS04	08210002	(1)	NTE74LS04	ECG74LS04	SK74LS04		HE-443-755
IC16A	D2732D	88941010	(2)	NTE2732(8)	ECG2732(8)			
IC17	TM2764D-2		(1)	NTE2764(8)	ECG2764(8)			
IC17A	D4016CX-15		(2)					
	uPD4016CX	08220031						
IC18	TM2016P-1	08220027	(1)	NTE2128	ECG2128			
IC18A	uPD4016		(2)	NTE2128	ECG2128			
	D4016CX-15							
	uPD4016CX	08220031						
IC19	D7811G	08220032	(1)					
	uPD7810		(2)					
	D4016CX-15							
IC19A	uPD4016CX	08220031						

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MODEL DELTA 10

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFGR. PART No.	REPLACEMENT DATA						
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.	
IC20	TMM2016P-1	08220027	(1)	NTE2128	ECG2128				
IC20A	uPD4016 D4016CX-15 uPD4016CX		(2)	NTE2128	ECG2128				
IC21	M74LS373P 74LS373	08210038	(1)	NTE74LS373	ECG74LS373	SK74LS373		HE-443-867	
IC22	HD74LS374P 74LS374		(1)	NTE74LS374	ECG74LS374	SK74LS373		HE-443-867	
IC23	MB74LS74A 74LS74	08210052	(1)	NTE74LS374	ECG74LS374	SK74LS373		HE-443-863	
IC24	D8253C-5 uPD8253C		(1)	NTE74LS74A NTE74LS74A	ECG74LS74A ECG74LS74A	SK74LS74A SK74LS74A		HE-443-730 HE-443-730 HE-443-1066 HE-443-1066	
IC25	78L12	08200045	(1)	NTE950	ECG950	SK9169/950		HE-442-644	
IC26	MC79L12ACP 79L12		(1)	NTE1903	ECG1903	SK9221/1903			
IC27	78L05	08200064 08200069	(1)	NTE1903 NTE977	ECG1903 ECG977	SK9221/1903 SK3462/977		221-Z9044	
IC28	STK780	08200068	(1)	NTE85	ECG85	SK3122	WEP736/123A*	121-Z9065	
TR1	STK-780 (2S)C1740S 2SC2785		(1)	NTE85	ECG85	SK3124A/289A	WEP910/289	921-1114	
TR1B	(2S)C1740S 2SC2785	07227851	(4)	NTE85	ECG85	SK3122	WEP736/123A*	121-Z9065	
TR2	(2S)A1175H 2SA1175		(1)	NTE290A NTE290A	ECG290A ECG290A	SK3124A/289A SK3114A/290A SK3114A/290A	WEP910/289 WEP911/290A WEP911/290A	921-1114 121-Z9003* 121-Z9003*	
TR2A	(2S)B707K 2SB707	07011751	(3)	NTE197	ECG197	SK3083/197	WEP757/197	121-988-03	
TR3	(2S)A1175H 2SA1175		(1)	NTE197 NTE290A NTE290A	ECG197 ECG290A ECG290A	SK3083/197 SK3114A/290A SK3114A/290A	WEP757/197 WEP911/290A WEP911/290A	121-988-03 121-Z9003* 121-Z9003*	
TR3A	(2S)D1308K 2SD1308	07011751 07313081	(3)	NTE290A	ECG290A	SK3114A/290A	WEP911/290A	121-Z9003*	

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement transistor for best results)

ITEM No.	TYPE No.	MFRG. PART No.	REPLACEMENT DATA					
			NOTES	NTE PART No.	ECG PART No.	RCA PART No.	WORKMAN PART No.	ZENITH PART No.
TR4	(2S)A1261L		(1)			SK3189A/183		
TR4A	2SA1261	07012611	(3)			SK3189A/183		
TR5	(2S)D1308K	07313081	(1)	NTE85	ECG85	SK3122	WEP736/123A*	121-Z9065
	(2S)C1740S	07227851		NTE85	ECG85	SK3124A/289A	WEP910/289	921-1114
TR5A	(2S)D1308K		(3)					
	2SD1308	07313081	(1)	NTE85	ECG85	SK3122	WEP736/123A*	121-Z9065
TR6	(2S)C1740S		(3)	NTE85	ECG85	SK3124A/289A	WEP910/289	921-1114
TR6A	(2S)D1308K	07313081						
	2SD1308		(3)					
TR7 thru	(2S)D1308K		(3)					
TR11	2SD1308	07313081	(3)					
TRA1	STA401A							
	PU4124	07650003	(1)	NTE5014A	ECG5014A	SK6A8/5014A	WEP1415/5014	103-Z9009
ZD1	6.8B2(ZENER)			NTE5014A	ECG5014A	SK6A8/5014A	WEP1415/5014	103-Z9009
	RD6.8EB2	08020033	(2)	NTE5009A	ECG5009A	SK4A7/5009A	WEP1409/5009	103-279-09
ZD1A	4.7B1(ZENER)		(3)	NTE5009A	ECG5009A	SK4A7/5009A	WEP1409/5009	103-279-09
	RD4.7EB1	08020030		NTE5002A	ECG5002A	SK2A7/5002A	WEP1402/5002	903-454
ZD1B	2.7B2(ZENER)		(3)	NTE5002A	ECG5002A	SK2A7/5002A	WEP1402/5002	903-454
	RD2.7EB2	08020036		NTE5081A	ECG5081A	SK24V/5081A	WEP1164/5081	103-Z9000
ZD2-ZD10	B240(ZENER)		(3)	NTE5081A	ECG5081A	SK24V/5081A	WEP1164/5081	103-Z9000
	BZ240	08020037						

* Lead configuration may vary from original.

- (1) Main Control Board.
- (2) Serial/Parallel Interface Board.
- (3) Drive Control Board.
- (4) Control Panel Board.
- (8) Requires programming.

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MODEL DELTA 10

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CAPACITORS

ITEM No.	RATING	MFGR. PART No.
C1C C2C C3C	AC INPUT BOARD	
	.01 125VAC	
	.0047 125VAC	
	.0047 125VAC	
C26 C27	MAIN CONTROL BOARD	
	10pF 50V NPO	05151002
	10pF 50V NPO	05151002

ITEM No.	RATING	MFGR. PART No.
C17A C32A CA1 CA2	PARALLEL/SERIAL INTERFACE BOARD	
	47pF 50V NPO	
	33pF 50V NPO	
	470pF	05654711
	470pF	05654711

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	WORKMAN PART No.
R27 R32 R33 R39 R42 R43 RA1 RA2 RA3 RA4 RA5 RA6	MAIN CONTROL BOARD			
	.22 5% 3W Metal Oxide	06230021		
	464 1% 1/4W Carbon Film	06244611		
	1200 1% 1/4W Carbon Film	06241221		
	4700 5% 1W Metal Oxide	06214721	1W247	22-3112
	330 5% 2W Metal Oxide	06203311	2W133	22-4084
	.22 5% 3W Metal Oxide	06230021		
	Resistor Network (1)	06582225		
	Resistor Network (2)	06582221		
	Resistor Network (3)	06584723		
	Resistor Network (3)	06584723		
	Resistor Network (4)	06581021		
	Resistor Network (5)	06581032		
R1B R2B R3B R4B R5B R6B R7B R8B R9B R10B R11B R12B RA1	DRIVER BOARD			
	1000 5% 2W Metal Oxide	06201021	2W210	22-4096
	1000 5% 1W Metal Oxide	06211021	1W210	22-3096
	180 5% 5W Wire Wound	06991811	5W118	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	1 2% 2W Metal Oxide	06200101	2W1D0	
	Resistor Network (6)	06581031		
RA1A RA2A, RA3A RA4A RA5A RA6A	PARALLEL/SERIAL INTERFACE BOARD			
	Resistor Network (3)	06584723		
	Resistor Network (3)	06584723		
	Resistor Network (5)	06581032		
	Resistor Network (7)	06581034		
	Resistor Network (6)	06581031		

- (1) Contains Nine (9 each) 2200, 5%.
 (2) Contains Four (4 each) 2200, 5%.
 (3) Contains Eight (8 each) 4700.
 (4) Contains Eight (8 each) 1000, 5%.

- (5) Contains Eight (8 each) 10K.
 (6) Contains Four (4 each) 10K.
 (7) Contains Six (6 each) 10K, 5%.

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

COILS & TRANSFORMERS

ITEM No.	FUNCTION	MFGR. PART No.	OTHER IDENTIFICATION	NOTES
L1	Choke (200uH)	09251005		
L2	Choke (350uH)	09251006		
T1	Power Transformer	87223112		

FUSE DEVICES

ITEM NO.	DESCRIPTION	MFGR. PART NO.		NOTES
		DEVICE	HOLDER	
F2	AC INPUT BOARD			
	2A @ 125V	09990026		
	Time Lag (1)			
	EAK1 220V/240V	09990030		
	CONTROL BOARD			
F1	3A @ 125V	09990025		
	Time Lag			

(1) On unit number 5MT2.

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
	MAIN CONTROL BOARD		
DSW1	DIP Switch	09090013	Print Selection
DSW2	DIP Switch	09090008	Mode Select
X1	Crystal	09250013	12MHz
	CONTROL PANEL BOARD		
BZ	Buzzer	45060201	
LED 1	LED	08300027	Power, Green
LED 2	LED	08300027	Ready, Green
LED 3	LED	08300027	On Line, Green
LED 4	LED	08300028	Paper, Out, Red
SW1	Switch	09010024	On Line
SW2	Switch	09010024	Form Feed
SW3	Switch	09010024	Line Feed
SW4	Switch	87049050	Right End Detector
	PARALLEL/SERIAL INTERFACE BOARD		
DSW1	DIP Switch	09090018	Baud Rate Select
XTAL	Crystal	09250010	4MHz
	CHASSIS		
M1	Print Head	89071000	
M2	Motor	87041030	Carriage
M3	Motor	87041040	Line Feed
M4	Sensor	87045060	Home Position
SW5	Switch	87045070	Paper Out
	PC Board	87222110	Main Control Board
	PC Board	87222121	Parallel/Serial Interface Board
	PC Board	87222130	Driver Board
	PC Board	87220320	Control Panel Board
	Unit	87223112	Power Supply 120V
	Unit	87223120	Power Supply 220V
	Unit	87223130	Power Supply 240V England
	Unit	87223140	Power Supply 240V Australia
	Rubber Foot	80200160	RUSSELL Industries Replacement GOB-2173 (4 Required)

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MODEL DELTA 10

PARTS LIST AND DESCRIPTION (Continued)

When ordering parts, state Model, Part Number, and Description

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.
Cabinet Top Case	87220410
Cabinet Bottom Case	87221021
Printer Cover Delta-10	87220090
Printer Cover Delta-10PC	87220180

ITEM	PART No.
Printer Cover Delta-10i	87220200
Printer Cover Delta-10 plus	87220190
Platen Knob	87224010

MECHANICAL PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1	87040331	Frame Base Assembly
2	87040370	Frame R Assembly
3	87040320	Frame L Assembly
4	82090280	Motor Holder
5	82910370	Paper Chute
6	82910380	Sub-Paper Chute
7	81370130	Carriage Stay
8	87040350	Frame Stay Assembly
9	87040360	Roller Holder Assembly
10	87049010	Ribbon Roller Assembly
11	87041030	Carriage Motor
12	87041040	Paper Feed Motor
13	87045060	Home Position Detector Board
14	87045050	Head Cable Board
15	87049050	Right-End Detector Unit
16	87045070	Paper-Out Detector Board
17	87029070	Carriage Stay (1) Assembly
18	87042020	Carriage Assembly
19	87043010	Platen Assembly
20	87049030	Bail Roller Assembly
21	82910360	Platen Cover
22	87049020	Pinch Roller Assembly
23	87059010	Adjusting Plate Assembly
24	87024010	Ribbon Base Assembly
25	87046010	Tractor Unit
26	89071000	Print Head
27	83900170	Adjustment Bushing
28	82400340	Adjustment Lever L
29	87029020	Clutch Level (1) Assembly
30	82400350	Release Lever

REF. NO.	PART NO.	DESCRIPTION
31	83900260	Release Cap
32	83100120	Idler Gear (1)
33	83120050	Spool Gear
34	83100110	Gear
35	82200010	Collar (1)
36	83200310	Spool Collar
37	82900090	Spring Weight
38	02304050	Thrust Collar
39	83200090	Bushing
40	82500200	Wave Washer (5)
41	02307050	Poly-Slider
42	83100200	Idler Gear (3)
43	80530170	Paper Holder Spring
44	80520090	Spool Spring
45	80510280	Release Spring
46	80510240	Paper-Out Detector Spring
47	04020010	Stop Ring E2
48	04020015	Stop Ring E3
49	04020016	Stop Ring E4
50	04020017	Stop Ring E5
51	04012002	Roll Pin SP2 - 10
52	04012501	Roll Pin SPP2.5 - 10
53	02010401	Nut N4
54	02040401	Spring Nut N4
55	02110401	Notched Washer WB4
56	01902018	Tapping Screw M2 x 4
57	01903018	Screw with Notched Washer M3 x 6
58	01903038	Tapping Screw with Washer M3 x 10

WIRING DATA

Shielded Hook-up Wire	Use BELDEN No. 8401 or 8421 (Single-Conductor) 8208 (Two-Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8529 (Solid) Available in 13 Colors 8522 (Stranded) Available in 13 Colors

GENERAL OPERATING INSTRUCTIONS

PRINTER SELF-TEST

To use the built-in self-test function, put paper into the Printer and hold down the LF (Line Feed) button while turning the Printer On.

When the Printer is turned On, it is "On-Line". Pressing the "On-Line" button changes the status of the Printer from "On-Line" to "Off-Line". When the Printer is "On-Line", the Ready light and "On-Line" light will be On. These lights will turn Off when the status of the Printer changes to "Off-Line".

DIP SWITCH SETTINGS

DSW1-1 sets selection of form length. For 11 inch form length set DSW1-1 to ON position. For 12 inch form length set DSW1-1 to OFF position.

DSW1-2 sets selection of print mode. For Normal print mode set DSW1-2 to On. For Emphasized print mode set DSW1-2 to Off.

DSW1-3 sets selection of print pitch. For 10 CPI (character per inch) set DSW1-3 to On position. For 17 CPI (character per inch) set DSW1-3 to Off position.

DSW1-4 sets selection to character set. Standard setting is On. See Character Set Table.

CHARACTER SET TABLE

CHARACTER SET	DSW1-1	DSW1-4
STANDARD ASCII	On	On
DOWN LOAD	On	Off
ITALIC ASCII	Off	On
ITALIC DOWN LOAD	Off	Off

DSW1-5 sets selection of line feed value. For 1/6 inch setting of line feed set DSW1-5 to On position. For 1/8 inch setting of line feed set DSW1-5 to Off position.

DSW1-6, DSW1-7 and DSW1-8 set selection of International Character Set and form length. See International Character Set Table.

INTERNATIONAL CHARACTER SET TABLE

COUNTRY	DSW1-6	DSW1-7	DSW1-8
USA	On	On	On
France	Off	On	On
Germany	On	Off	On
Denmark	On	On	Off
England	Off	Off	On
Sweden	Off	On	Off
Italy	On	Off	Off
Spain	Off	Off	Off

DSW2-1 sets the selection of paper out sensor. If DSW2-1 is set to On position (standard setting), the Printer is disabled when out of paper, and sends the signal to the host Computer to stop sending more information. If DSW2-1 is set to Off position, the Printer is allowed to print without paper in the unit.

DSW2-2 sets the selection of the Serial or Parallel Interface. For Serial Interface set DSW2-2 to ON position. For Parallel Interface set DSW2-2 to OFF position.

DSW2-3 sets the selection of 7 or 8 Bit interface selection. If DSW2-3 is set to On position, interface is set to 7 bits. If DSW2-3 is set to Off position, interface is set to 8 bits (standard setting).

DSW2-4 sets the Printer auto line feed On or Off. If DSW2-4 is set to On position auto line feed is performed by CR code. If DSW2-4 is set to Off position auto line feed is not performed by input of CR code (standard setting).

PARALLEL/SERIAL INTERFACE BOARD

DSW1-1 sets length of data byte, 7 or 8 bit. DSW1-1 is set ON for 7 bits (standard setting). DSW1-1 is set OFF for 8 bits.

DSW1-2 sets Parity selection. DSW1-2 is set to ON position (standard setting). DSW1-2 is set OFF for No Parity check.

DSW1-3 and DSW1-4 set Serial Interface Handshaking.

Handshaking	DSW1-3	DSW1-4
Serial Busy, 1 Byte mode	OFF	OFF
Serial Busy, 1 Block mode	ON	OFF
ACK mode	OFF	ON
XON/XOFF mode	ON	ON

DSW1-5 set Parity condition ODD or EVEN. Set DSW1-5 ON for Odd Parity. Set DSW1-5 OFF for Even Parity.

DSW1-6, DSW1-7 and DSW1-8 set baud Rate for Serial Interface.

Baud Rate	9600	4800	2400	1200	600	300	bit/sec
DSW1-6	ON	ON	ON	ON	OFF	OFF	
DSW1-7	ON	ON	OFF	OFF	ON	ON	
DSW1-8	ON	OFF	ON	OFF	ON	OFF	

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CONNECTOR CONFIGURATION FOR PARALLEL INTERFACE

Pin No.	Signal	Direction	Activity
1	STROBE	IN	Strobe Pulse used to read data in. It is normally High. When the pulse goes Low, data is read in.
2 thru 9	DATA 1 thru DATA 8	IN	Parallel data bits 1 through 8 information.
10	ACK	OUT	A pulse of 9 μ sec to acknowledge that data is received and the Printer is ready for new data.
11	BUSY	OUT	A signal that indicates the Printer is busy. When the signal goes Low, next data transmission is permitted.
12	PAPER END	OUT	This signal is normally Low. If the signal is High it indicates a paper out condition. If DSW2-1 is set to Off position, this signal is held Low.
13	SELECTED	OUT	When this signal is High the Printer is in "On-Line" mode.
14	NC		Not Used
15	NC		Not Used
16	SIGNAL GND		Signal Ground
17	CHASSIS GND		Printer Frame Ground
18	+ 5VDC	OUT	External Power + 5VDC, 50mA Maximum
19	Return Pin 1		
20	Return Pin 2		
thru 27	Return Pin 9		
28	Return Pin 10		
29	Return Pin 11		
30	Return Pin 12		
31	INPUT PRIME IN		This signal is Low when the Printer is initialized or reset and the memory buffer is cleared.
32	ERROR	OUT	This signal goes Low when the Printer detects abnormal status.
33	EXT GND		External Ground
34	NC		Not Used
35	NC		Not Used
36	NC		Not Used

CONNECTOR CONFIGURATION FOR SERIAL INTERFACE

Pin No.	Signal	Direction	Activity
1	FGND		Frame Ground
2	TXD	OUT	Transmit data from printer "STATUS"
3	RXD	IN	Receive data to the printer
4	RTS	OUT	Request to send
5	CTS	IN	Clear to send
6	DSR	IN	Data set ready
7	S-GND		Signal ground
8	DCD	IN	Data carrier Detect
11	Busy	OUT	Signal for serial Busy Control
13	S-GND		Signal ground
20	DTR	OUT	Data terminal Ready

LINE DEFINITIONS

A0 THRU A15 Address
 ACK Acknowledge, Data Received
 B-BUSY Buffer Busy, Input Not Received
 B-STB Buffer Strobe
 BD0 THRU BD7 Buffered Data
 BUSY Busy, Input Not Received
 C-ACK Control Acknowledge
 C-BUSY Control Busy
 C-ERR Control Error
 CK Clock
 CLK1 Clock One
 CS Chip Select
 CS5 THRU CS9 Chip Select Lines
 CTS Clear to Send
 CTS(S) Clear to Send, Serial
 D0 THRU D7 Data
 DCD Data Carrier Detect
 DCD(S) Data Carrier Detect, Serial
 DSR Data Set Ready
 DSR(S) Data Set Ready, Serial
 DTR Data Terminal Ready
 DTR(S) Data Terminal Ready, Serial
 ERR Error
 HMG1 THRU HMG9 Print Head Driving Coils
 ICR1 THRU ICR5 Carriage Motor Driving Pulses

ILF1 Line Feed Motor Power Switch
 ILF2 THRU ILF5 Line Feed, Driving Pulses
 IN-PRIME Input Prime, Initializes Printer
 INT Interrupt
 ON-LINE On Line, Ready to Receive Data
 P-END Paper End Sensor
 PA0 THRU PA7 Input/Output Ports 0 Thru 7
 PB0 THRU PB4 Input/Output Ports 0 Thru 4
 PC5,6,7 Input/Output Ports 5,6,7
 RD Read Data
 RES Reset
 RESET Reset
 REV-CH Reverse Channel
 REV-CH(S) Reverse Channel, Serial
 RTS Request Transmission
 RTS(S) Request Transmission, Serial
 RXD Receive Data
 RXD(S) Receive Data, Serial
 SEL-IN Select Input
 SERIAL Serial
 SLCT Select
 STB Strobe
 TXD Transmit Data
 TXD(S) Transmit Data, Serial
 WR Write Data

SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.
2. Maintain AC line voltage at rated input.
3. Remove AC power from the Printer before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductors "chip" components.
4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.
5. Use a grounded-tip, low voltage soldering iron.
6. Use an isolation (times 10) probe on scope.
7. Do not remove or install board, mechanical or electrical parts, or other peripherals with Printer AC power On.
8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.
9. This Printer is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.
10. Periodically examine the AC power cord for damaged or cracked insulation.
11. The Printer cabinet is equipped with vents to prevent heat build-up. Never block, cover, or obstruct these vents.
12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.
13. Never expose the Printer to water. If exposed to water turn the unit Off. Do not place the Printer near possible water sources.

SCHEMATIC NOTES

—* Circuitry not used in some versions

--- Circuitry used in some versions

⊕ See parts list

⊞ Ground

Voltages measured with digital meter.

Waveforms and voltages are taken from ground, unless noted otherwise.

Voltages, waveforms and logic readings taken with Printer running in Self-Test mode.

Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling on "0" reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 7.5cm width with DC reference voltage given at the bottom line of each waveform.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Supply voltage maintained as shown at input.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

Capacitors are 50 volts or less, 5% unless noted.

Electrolytic capacitors are 50 volts or less, 20% unless noted.

Resistors are ½W or less, 5% unless noted.

Value in () used in some versions.

Measurements taken with switching as shown, unless noted.

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No lights On)

(1) Probe indicates H when Printer is off line.

(2) Probe indicates L when Printer is printing data from computer.

(3) Probe indicates L when Printer is out of paper.

MECHANICAL REMOVAL AND REPLACEMENT

PRINT HEAD REMOVAL

Remove the Printer cover. Remove the ink ribbon. While holding the Head Cable Board, extract the head cable from the head connector using the plastic pull tab under the head cable at the connector. Remove two screws and washers fastening the Print Head (M1) to the Carriage Assembly (18). Pull the Print Head upwards and remove.

PLATEN ASSEMBLY REMOVAL

Remove the upper case and Tractor Unit. See "Disassembly Instructions" and "Tractor Unit Removal". Remove two screws at both ends of the Platen Cover (21) and remove the cover. Remove the stop ring (49) that holds the idler gear (42) and draw the idler gear out as much as possible. Remove the stop ring (50) on the opposite side of the Platen Assembly and draw out the wave washer (40), poly-slider (41) and bushing (39). Draw out Platen until bushing on gear side comes off. Lift Platen Assembly out of the Printer Mechanism.

TRACTOR UNIT REMOVAL

Pull Left and Right Snap Levers toward the front at the same time. While holding the levers forward, rotate the Tractor Unit up and back to clear the Paper Clamp Lever pivot posts. Lift Tractor Unit clear of the supporting stopper posts.

CARRIAGE MOTOR REMOVAL

Remove the Printer Mechanism. See "Printer Mechanism Removal". Remove the tie wrap holding lead wires coming from the Carriage Motor (M2). Loosen one screw fastening the Adjusting Plate (23). Push the Timing Pulley to the right in reference to platen (19). Remove three Phillips screws

securing the Motor Holder (4) to the mechanism. Remove the Motor Holder from the frame base and remove the Timing Belt. Remove two Phillips screws holding the Carriage Motor to the Motor Holder. Reverse the procedure to install replacement motor. See Miscellaneous Adjustments for Timing Belt Tension Adjustment.

PAPER FEED MOTOR REMOVAL

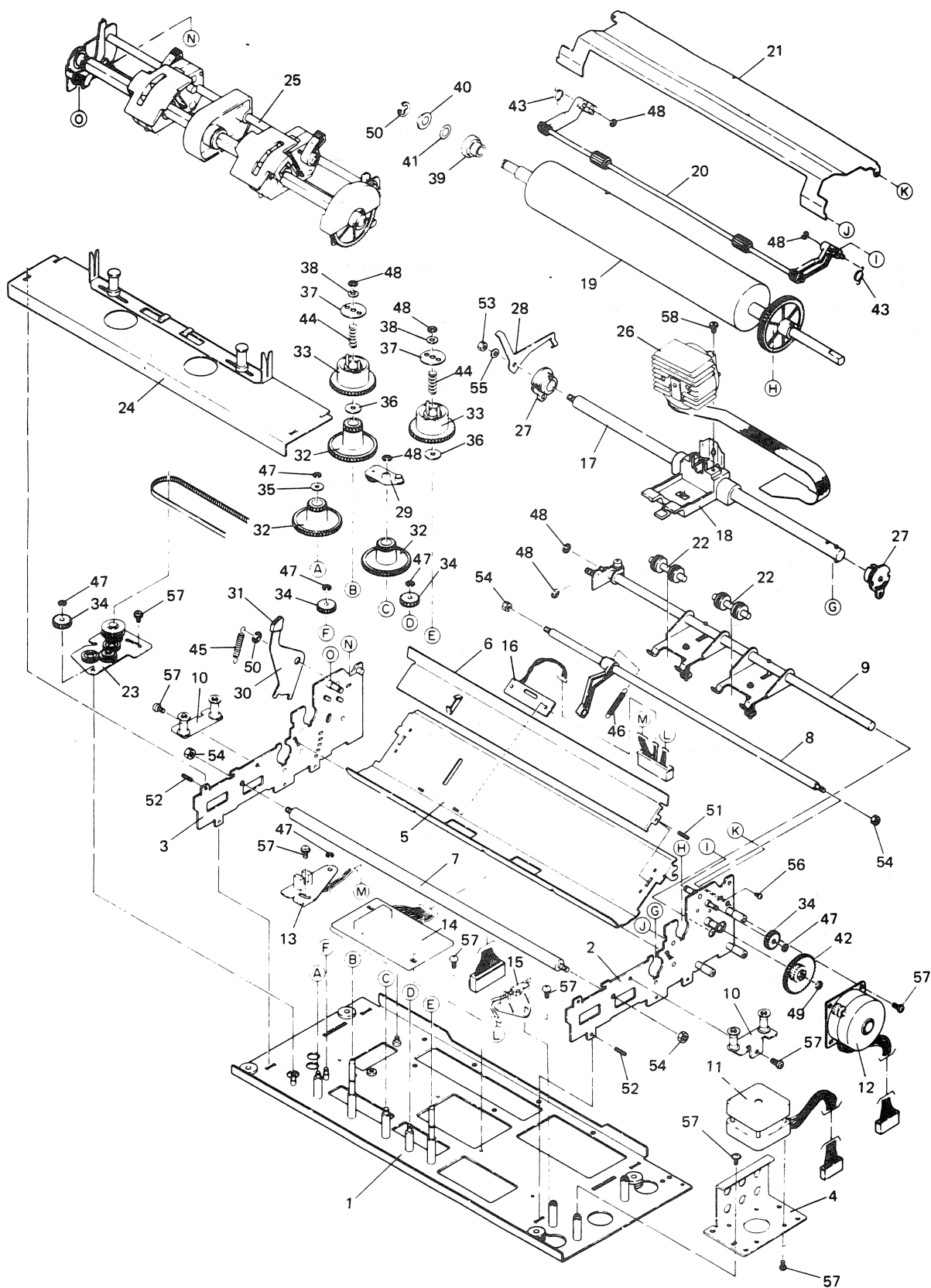
Remove the Printer Mechanism. See "Disassembly Instructions". Remove tie wrap holding lead wires. Remove three Phillips screws fastening Line Feed Motor (M2). Reverse the procedure to install replacement motor.

RIBBON BASE ASSEMBLY REMOVAL

Remove upper case. See "Disassembly Instructions". Remove roll pins at each end of Ribbon Base Assembly (52). Lift assembly up in front and slide it out of the notches in frame pieces. This will expose Timing Pulley, Adjusting Plate Assembly (23), ribbon movement (spool) gears with clutch lever assembly and Right End Detector Unit (15).

TIMING BELT REMOVAL

Remove Printer Mechanism, Print Head (M1), Ribbon Base Assembly (24) and Carriage Motor (M2). Refer respectively to "Disassembly Instructions", "Print Head Removal", "Ribbon Base Assembly Removal" and "Carriage Motor Removal". Loosen set screw of Adjusting Plate (23) and free the belt from the Timing Pulley. Remove two screws holding Head Cable Board (14). Stand Printer Mechanism on its back and carefully pull Head Cable Board out thru the large square cutout. Move Print Head over the cutout. Remove the screw securing the belt clamp to the Carriage Assembly (18), and free Timing Belt. To install new belt reverse this procedure. See Timing Belt Tension Adjustment in Miscellaneous Adjustments.



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Courtesy of the Manufacturer

MECHANICAL-EXPLODED VIEW

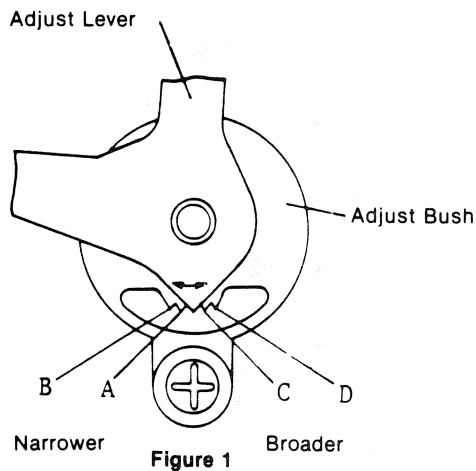
MISCELLANEOUS ADJUSTMENTS

PRINT HEAD TO PLATEN GAP ADJUSTMENT

Place the Platen Adjust Lever at the second step position (handle straight up). Insert a feeler gauge between the ribbon guide and the platen. The gap should measure between 0.25mm and 0.35mm. Check the gap with the Print Head at the left, center and right of platen for uniformity.

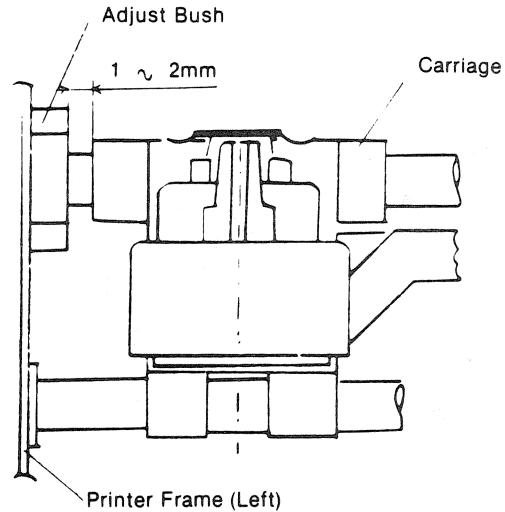
If the platen gap is out of tolerance, the following adjustment is required.

Move the Platen Adjust Lever all the way forward until adjust bush hole lines up with frame hole. Fasten the left and right adjust bushes with an (M3 x 6) screw into left and right frame tap holes. Remove nut and lock washer holding adjust lever. If the gap is too wide place the adjust lever on point A or B. See Figure 1. If gap is too narrow place the adjust lever on point C or D. See Figure 1. Retighten nut on adjust lever and remove the two retaining screws from tap holes. Check gap measurement.



CARRIAGE POSITION ADJUSTMENT (HOME POSITION)

Turn the Printer On. The Carriage will move to the left and stop. Measure the gap between the adjust bush and the Carriage. It should be between 1 and 2mm. See Figure 2. To adjust, loosen the screw on the Home Position Detector Board. Pivot the board either left or right depending if the gap is too wide or too narrow. To check the adjustment turn the Printer On and measure the gap. Repeat the procedure until gap setting is correct.



RIGHT-END DETECTOR ADJUSTMENT

If the Right-End Detector Switch is not closing when the Carriage Assembly is moved to the far right, adjustment is required. Remove the ink ribbon spools. Remove two pins holding Ribbon Base Assembly and remove assembly. Slide Carriage Assembly to far right. Loosen screw in slotted hole of detector switch. Pivot switch until it just closes and tighten screw.

TIMING BELT TENSION ADJUSTMENT

Slide Carriage Assembly to far right. Locate left timing belt pulley Adjusting Plate. Loosen screw in slotted hole of Adjusting Plate. Adjust belt tension for 30 grams \pm 10%. Adjustment is made by pushing the pulley to the left until proper tension is obtained. If adjustment cannot be made within tolerance, replacement of timing belt is required. See Timing Belt Removal. Tighten screw and apply screw lock.

LOGIC CHART **MAIN CONTROL BOARD**

PIN NO.	IC 1	IC 2	IC 3	IC 4	IC 5	IC 6	IC 7	IC 8	IC 9	IC 10	IC 11	IC 12
1	H	L	H	H	L	H	P	H	P	L	H	P
2	L	H	L	L	H	H	H	P	H	H	P	H
3	H	L	H	H	L	*	H	P	H	P	P	H
4	L	H	L	L	H	H	L	P	P	P	H	P
5	H	L	H	H	H	H	H	H	H	L	H	H
6	L	H	L	L	L	L	L	H	H	H	H	H
7	L	L	L	L	L	L	*	H	P	P	L	P
8	L	H	L	L	L	H	L	L	L	P	H	L
9	H	L	H	H	H	H	*	P	P	L	H	P
10	L	L	P	L	L	H	*	P	H	L	H	H
11	H	H	P	H	H	*	*	P	H	P	P	H
12	L	L	H	L	L	H	H	P	P	L	P	P
13	H	H	L	H	H	L	H	P	H	P	P	H
14	H	H	H	H	H	H	L	P	H	P	H	H
15							L	P	P	L		P
16							H	H	H	L		H
17										P		
18										P		
19										L		
20										H		

PIN NO.	IC 13	PIN NO.	IC 13	PIN NO.	IC 14	IC 15	IC 16	PIN NO.	IC 17	PIN NO.	IC 17
1	H	15	P	1	P	P	L	1	H	15	P
2	P	16	P	2	H	P	H	2	P	16	P
3	P	17	P	3	H	P	L	3	P	17	P
4	P	18	P	4	P	P	H	4	P	18	P
5	P	19	P	5	H	P	L	5	P	19	P
6	P	20	P	6	H	P	H	6	P	20	P
7	P	21	P	7	L	L	L	7	P	21	P
8	P	22	P	8	H	P	L	8	P	22	P
9	P	23	P	9	P	P	H	9	P	23	P
10	P	24	P	10	H	P	H	10	P	24	P
11	P	25	P	11	H	H	L	11	P	25	P
12	P	26	H	12	P	*	H	12	P	26	H
13	P	27	H	13	H	*	L	13	P	27	H
14	L	28	H	14	H	H	H	14	L	28	H

Logic Probe Display

L = Low

H = High

P = Pulse

* = Open (No lights On)

STAR
MODEL DELTA 10

LOGIC CHART (Continued) **MAIN CONTROL BOARD**

PIN NO	IC 18	PIN NO.	IC 18	PIN NO.	IC 19	PIN NO.	IC 19	PIN NO.	IC 19	PIN NO.	IC 19
1	P	13	P	1	H	17	L	33	L	49	P
2	P	14	P	2	H	18	L	34	*	50	P
3	P	15	P	3	H	19	L	35	*	51	P
4	P	16	P	4	H	20	H	36	*	52	P
5	P	17	P	5	H	21	L	37	*	53	P
6	P	18	H	6	H	22	L	38	*	54	P
7	P	19	P	7	H	23	H	39	*	55	P
8	P	20	P	8	H	24	H	40	*	56	P
9	P	21	P	9	H	25	H	41	*	57	P
10	P	22	P	10	H	26	H	42	L	58	P
11	P	23	P	11	L	27	P	43	L	59	P
12	L	24	H	12	L	28	H	44	P	60	P
13				13	L	29	P	45	P	61	P
14				14	L	30	P	46	P	62	P
15				15	L	31	P	47	P	63	H
16				16	H	32	L	48	P	64	H

PIN NO	IC 20	PIN NO.	IC 20	PIN NO.	IC 21	IC 22	IC 23	PIN NO.	IC 24	PIN NO.	IC 24
1	P	13	P	1	L	H	*	1	P	13	H
2	P	14	P	2	P	P	*	2	P	14	L
3	P	15	P	3	P	P	*	3	P	15	L
4	P	16	P	4	P	P	*	4	P	16	L
5	P	17	P	5	P	P	H	5	P	17	H
6	P	18	H	6	P	P	L	6	P	18	L
7	P	19	P	7	P	P	L	7	P	19	P
8	P	20	P	8	P	P	H	8	P	20	P
9	P	21	P	9	P	P	L	9	L	21	H
10	P	22	P	10	L	L	H	10	L	22	P
11	P	23	P	11	P	H	H	11	L	23	P
12	L	24	H	12	P	P	H	12	L	24	H
13				13	P	P	H				
14				14	P	P	H				
15				15	P	P					
16				16	P	P					
17				17	P	P					
18				18	P	P					
19				19	P	P					
20				20	H	H					

LOGIC CHART (Continued) **PARALLEL/SERIAL INTERFACE BOARD**

PIN NO.	IC 1A	IC 2A	IC 3A	IC 4A	IC 5A	IC 6A	IC 7A	IC 8A	IC 9A	IC 10A	IC 11A	IC 12A	IC 13A
1	L	L	H	H	H	L	H	P	L	P	H	H	H
2	H	H	P	P	H	H	H	H	L	P	L	P	H
3	L	L	H	P	H	L	H	P	H	P	L	P	L
4	H	H	H	P	H	H	H	H	L	P	H	H	L
5	H	L	P	P	H	L	L	H	L	P	H	P	H
6	L	H	P	P	H	H		P	H	P	L	P	H
7	H	L	H	P	L	L		L	L	L	L	L	L
8	L	H	H	P	H	H		P	H	P	L	H	P
9	H	L	P	P	H	L		H	L	P	H	L	P
10	L	L	L	L	H	L		H	L	L	L	H	P
11	H	H	L	P	H	H		P	H	H	H	L	L
12	H	L	P	P	H	L		H	L	L	P	H	H
13	L	H(3)	H	P	P	H		H	L	*	P	H	H
14	H	H	H	P	H	H		H	H	H	H	H	H
15	L		P	P									
16	H		P	P									
17			H	P									
18			H	P									
19			P	L									
20			H	H									

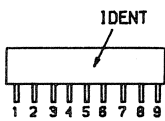
PIN NO	IC 14A	PIN NO.	IC 14A	PIN NO.	IC 14A	PIN NO.	IC 14A	PIN NO.	IC 15A	PIN NO.	IC 16A	PIN NO	IC 16A
1	L	17	P	33	H	49	P	1	P	1	P	13	P
2	H	18	L	34	H	50	P	2	P	2	P	14	P
3	P	19	L	35	L	51	P	3	H	3	P	15	P
4	P	20	L	36	L	52	P	4	H	4	P	16	P
5	P	21	L	37	L	53	P	5	H	5	P	17	P
6	P	22	L	38	L	54	P	6	H	6	P	18	P
7	P	23	L(1)	39	L	55	P	7	H	7	P	19	P
8	P	24	H(2)	40	L	56	P	8	L	8	P	20	P
9	P	25	H	41	H	57	P	9	H	9	P	21	P
10	P	26	H	42	H	58	P	10	H	10	P	22	P
11	H	27	H	43	H	59	P	11	H	11	P	23	P
12	L	28	L	44	H	60	P	12	P	12	L	24	H
13	*	29	H	45	H	61	P	13	P				
14	H	30	L	46	H	62	P	14	P				
15	P	31	P	47	H	63	P	15	P				
16	H	32	L	48	H	64	H	16	H				

STAR
MODEL DELTA 10

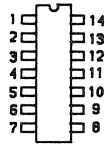
PIN NO	IC 17A	PIN NO.	IC 17A	PIN NO.	IC 18A	PIN NO.	IC 18A	PIN NO.	IC 19A	PIN NO.	IC 19A	PIN NO.	IC 20A	PIN NO.	IC 20A
1	P	13	P	1	P	13	P	1	P	13	P	1	P	13	P
2	P	14	P	2	P	14	P	2	P	14	P	2	P	14	P
3	P	15	P	3	P	15	P	3	P	15	P	3	P	15	P
4	P	16	P	4	P	16	P	4	P	16	P	4	P	16	P
5	P	17	P	5	P	17	P	5	P	17	P	5	P	17	P
6	P	18	H	6	P	18	H	6	P	18	H	6	P	18	H
7	P	19	P	7	P	19	P	7	P	19	P	7	P	19	P
8	P	20	P	8	P	20	P	8	P	20	P	8	P	20	P
9	P	21	H	9	P	21	H	9	P	21	H	9	P	21	H
10	P	22	P	10	P	22	P	10	P	22	P	10	P	22	P
11	P	23	P	11	P	23	P	11	P	23	P	11	P	23	P
12	L	24	H	12	L	24	H	12	L	24	H	12	L	24	H

- (1) Probe indicates H when Printer is off line.
- (2) Probe indicates L when Printer is printing data from computer.
- (3) Probe indicates L when Printer is out of paper.

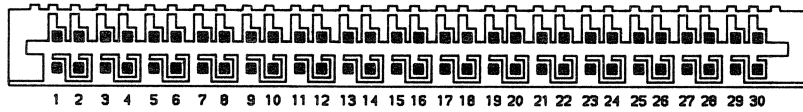
IC PINOUTS & TERMINAL GUIDES



CA1, CA2,
RA1A THRU RA4A
FRONT VIEW



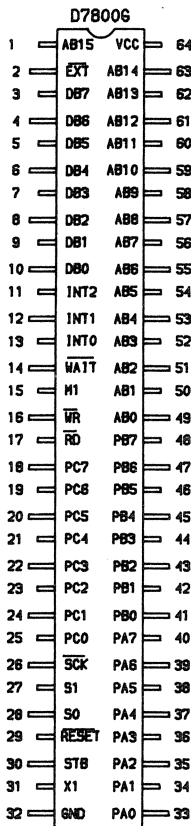
IC2A, IC5A, IC6A,
IC8A THRU IC11A,
IC13A
TOP VIEW



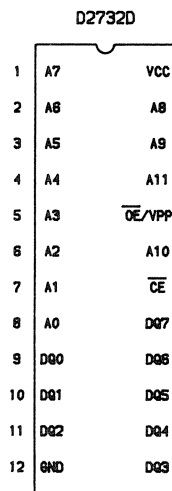
SN74LS74AN

CN1A, CN2A
TOP VIEW

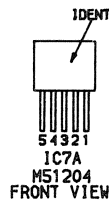
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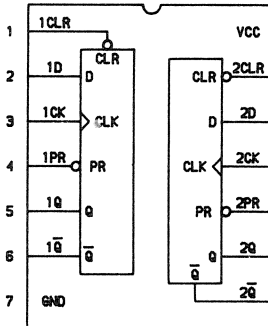
IC14A
CONTROLLER
TOP VIEW



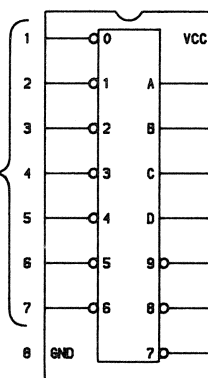
IC16A
EAPROM
TOP VIEW



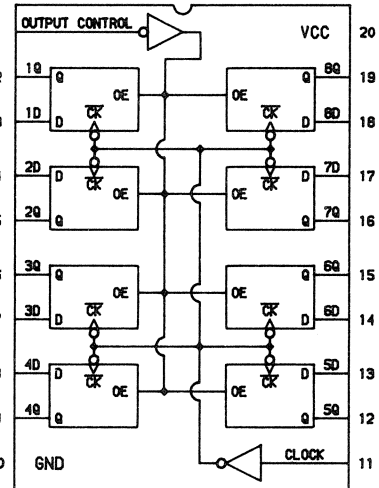
IC7A
MS1204
FRONT VIEW



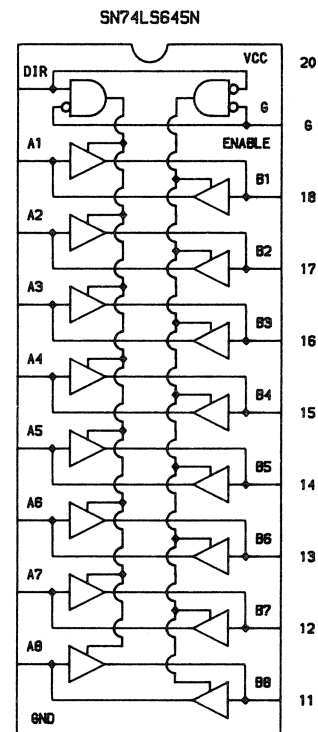
IC12A
FLIP/FLOP
TOP VIEW



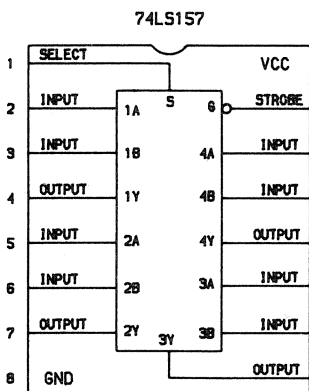
IC15A
DECODER
TOP VIEW



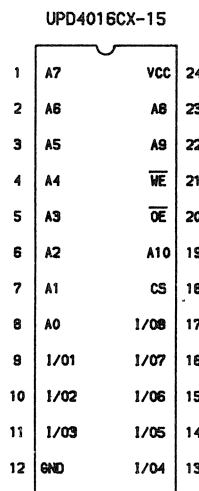
IC3A
FLIP/FLOP
TOP VIEW



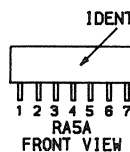
IC4A
TRANSCEIVER
TOP VIEW



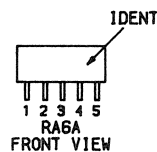
IC1A
SELECTOR
TOP VIEW



IC17A THRU IC20A
RAM
TOP VIEW

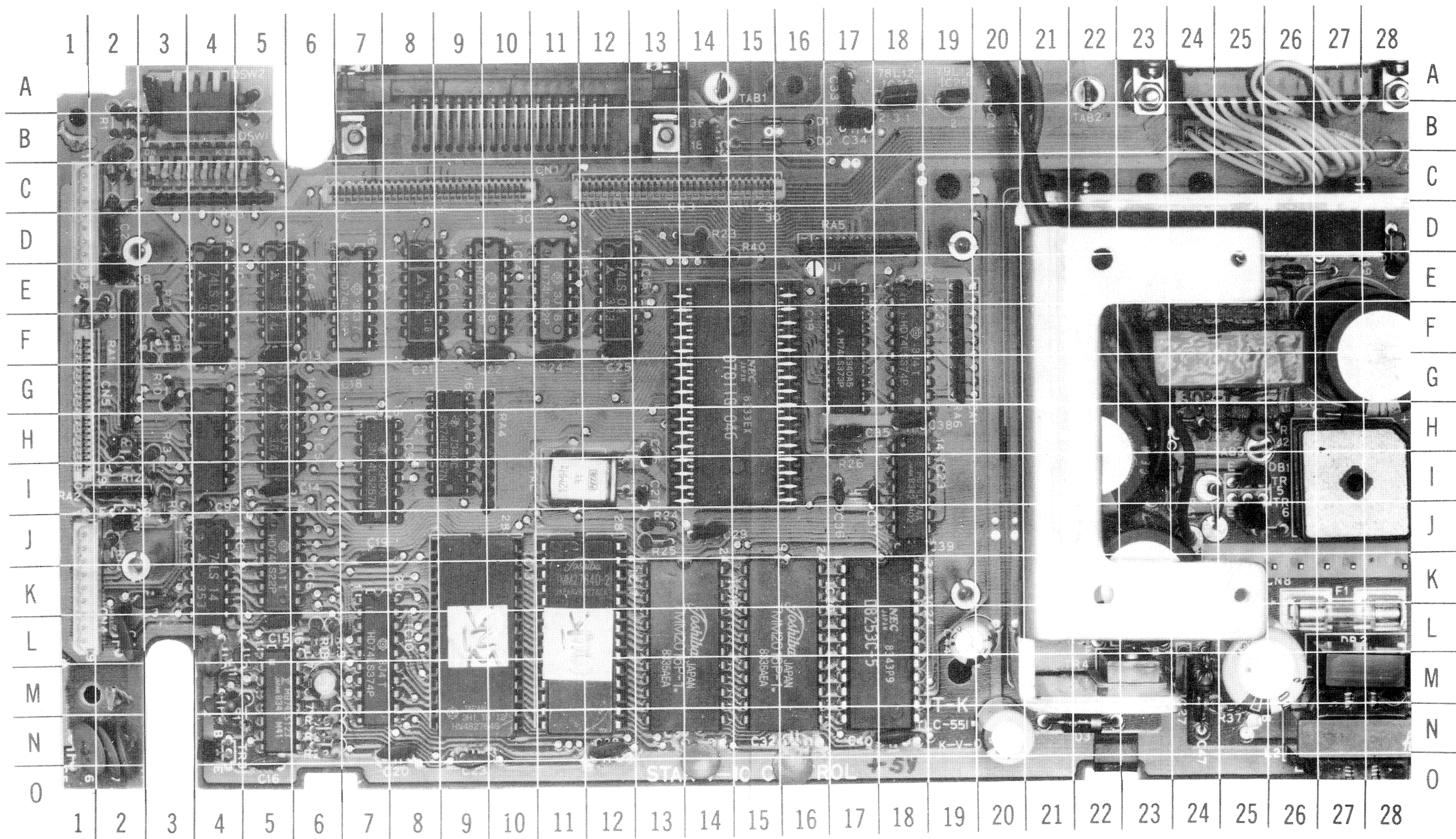


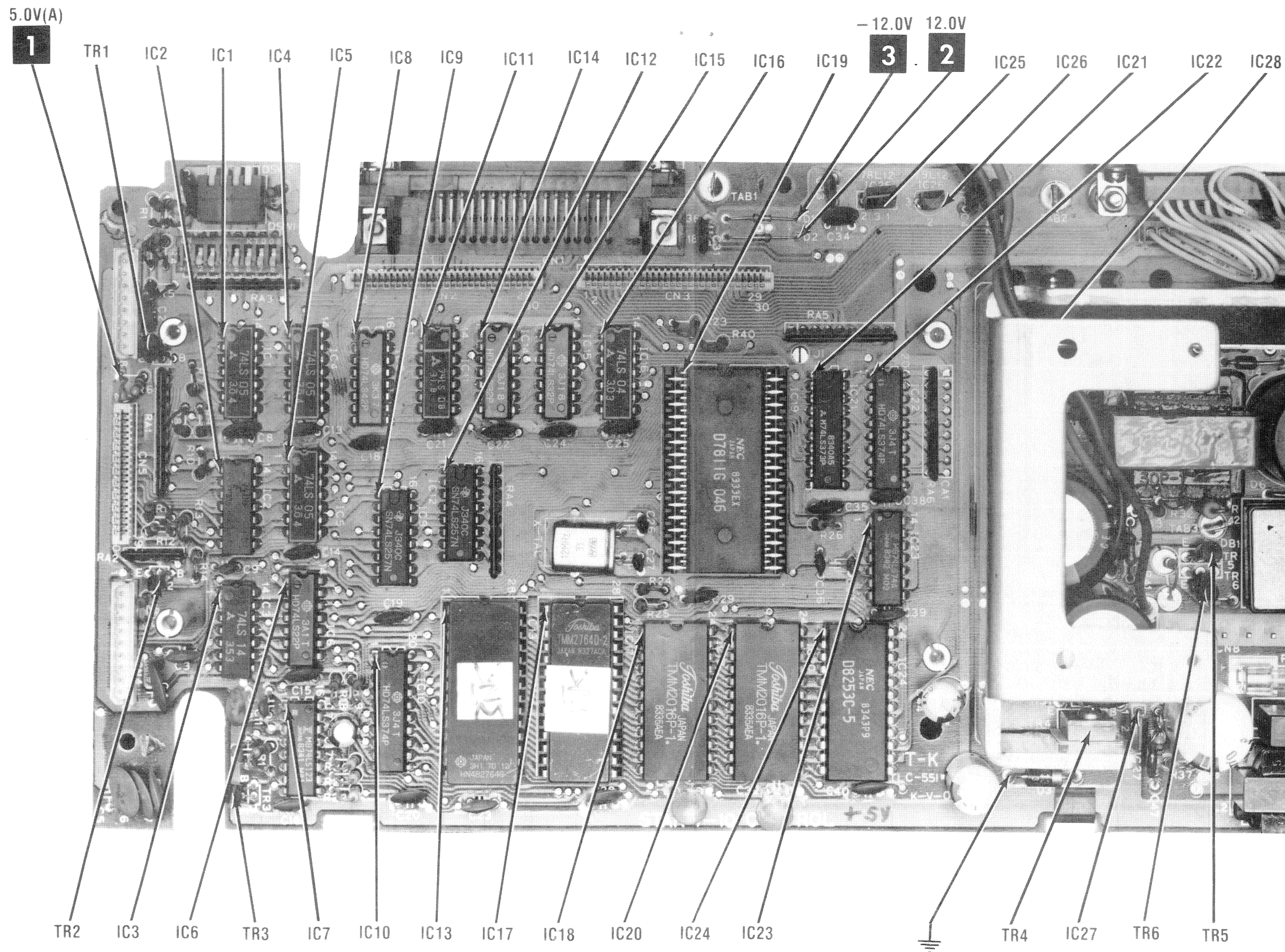
RA5A
FRONT VIEW



RA6A
FRONT VIEW

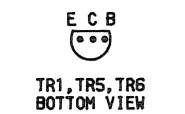
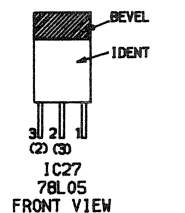
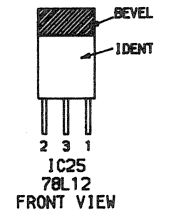
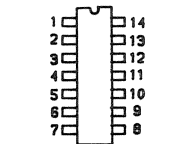
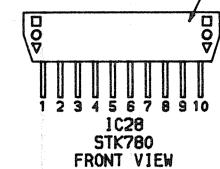
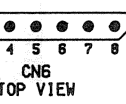
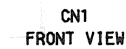
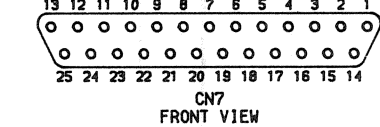
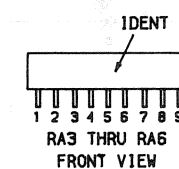
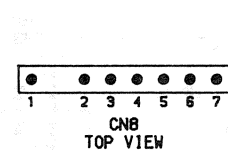
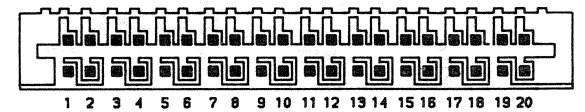
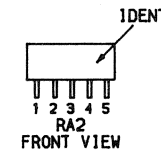
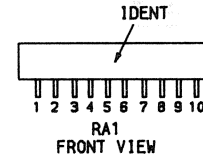
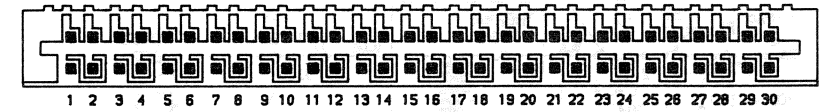
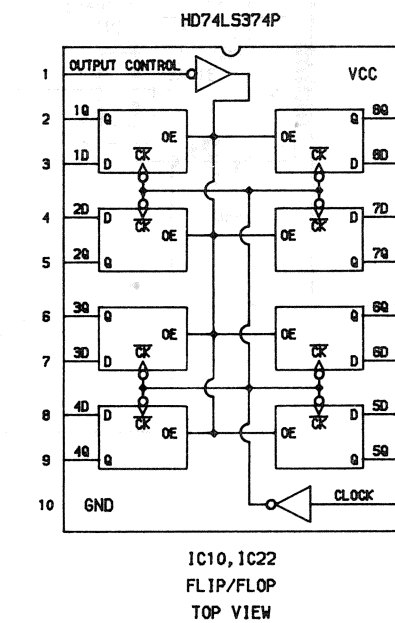
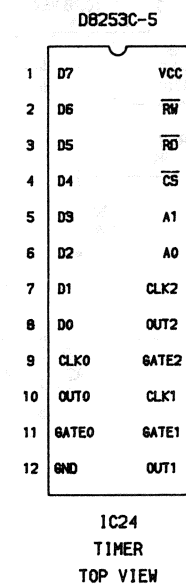
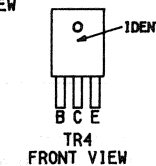
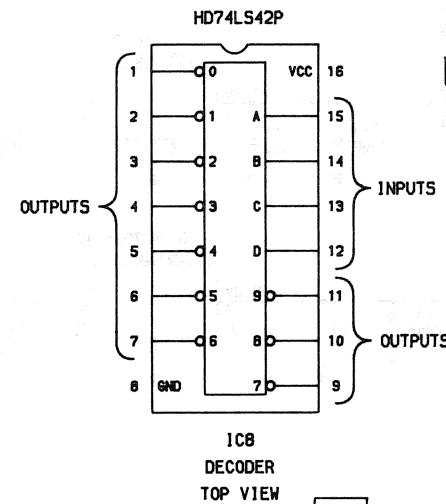
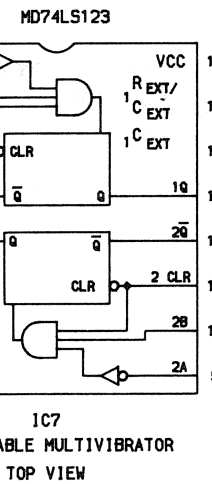
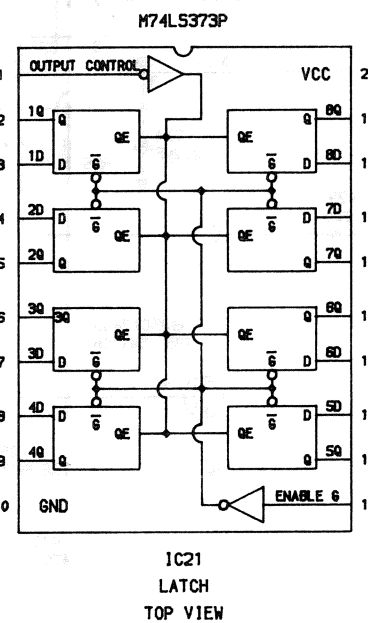
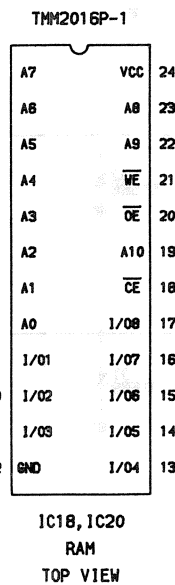
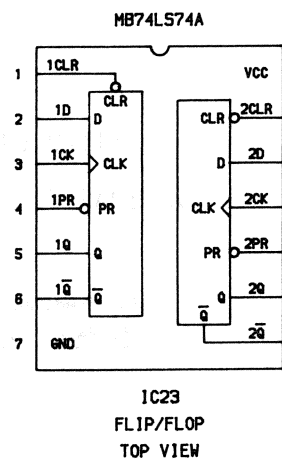
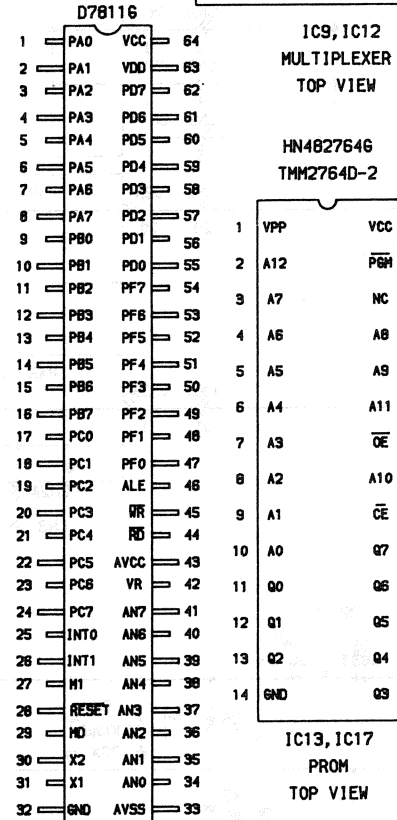
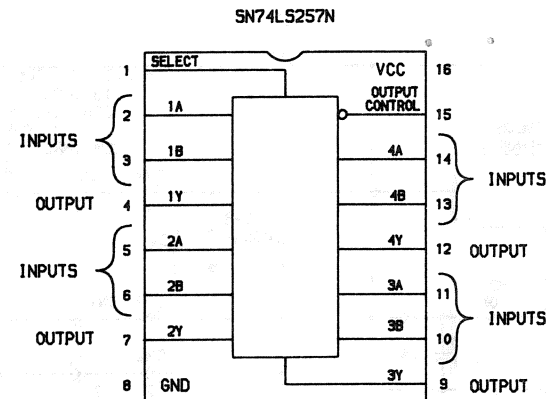
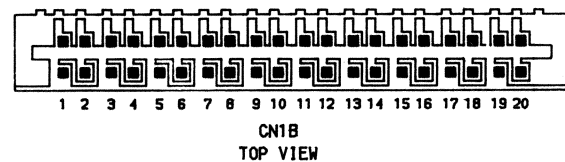
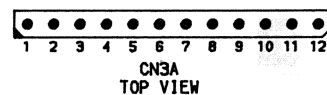
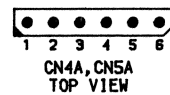
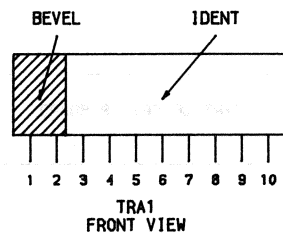
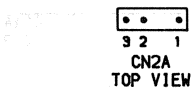
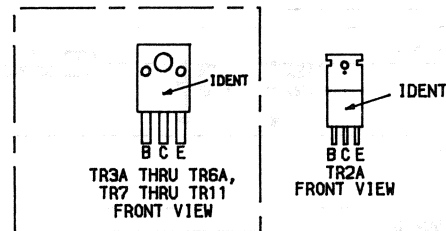
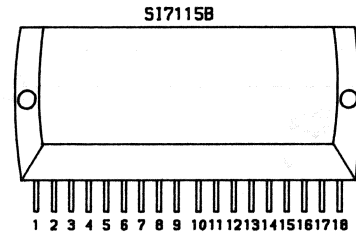
PARALLEL/SERIAL INTERFACE BOARD





IC PINOUTS & TERMINAL GUIDES

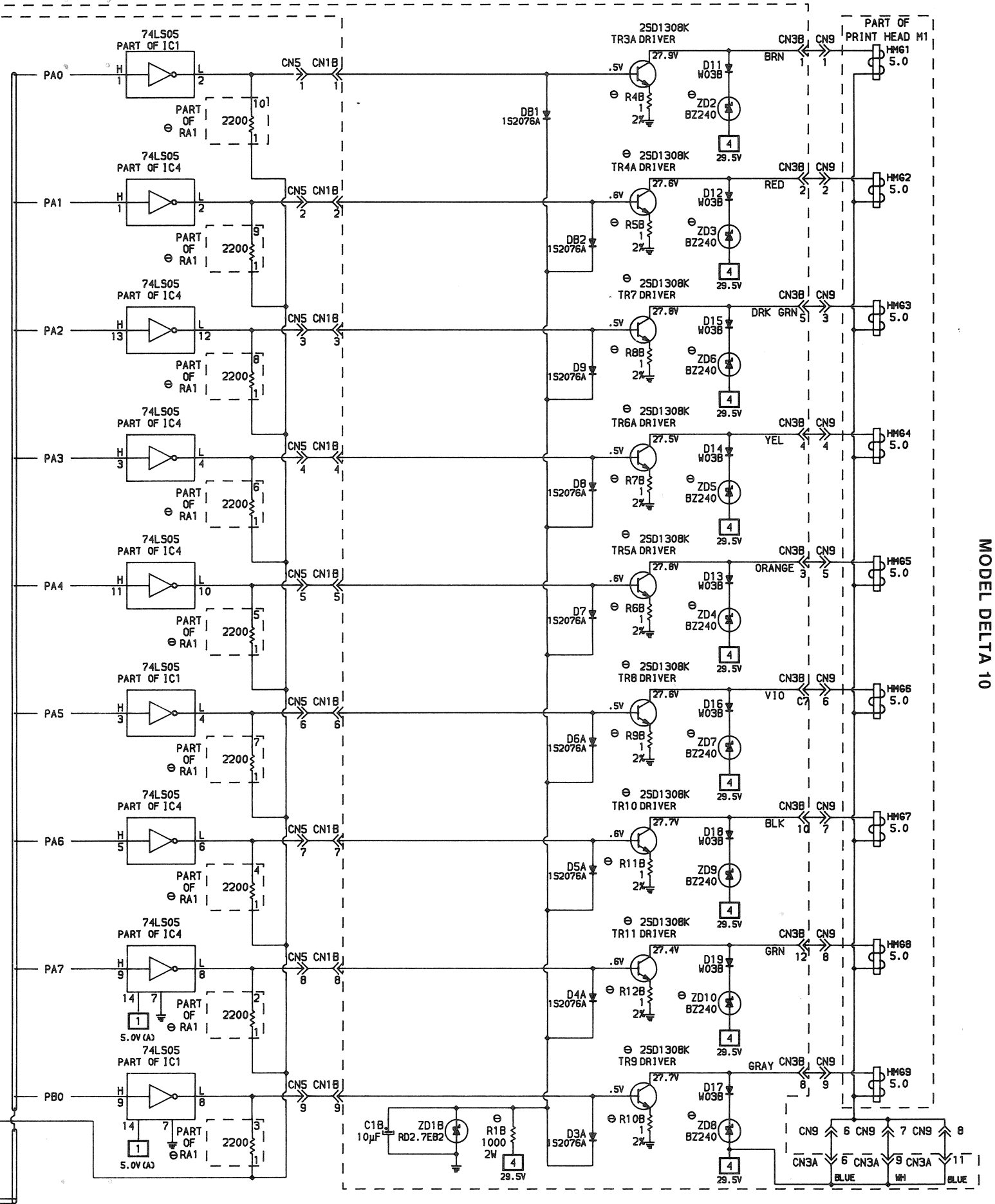
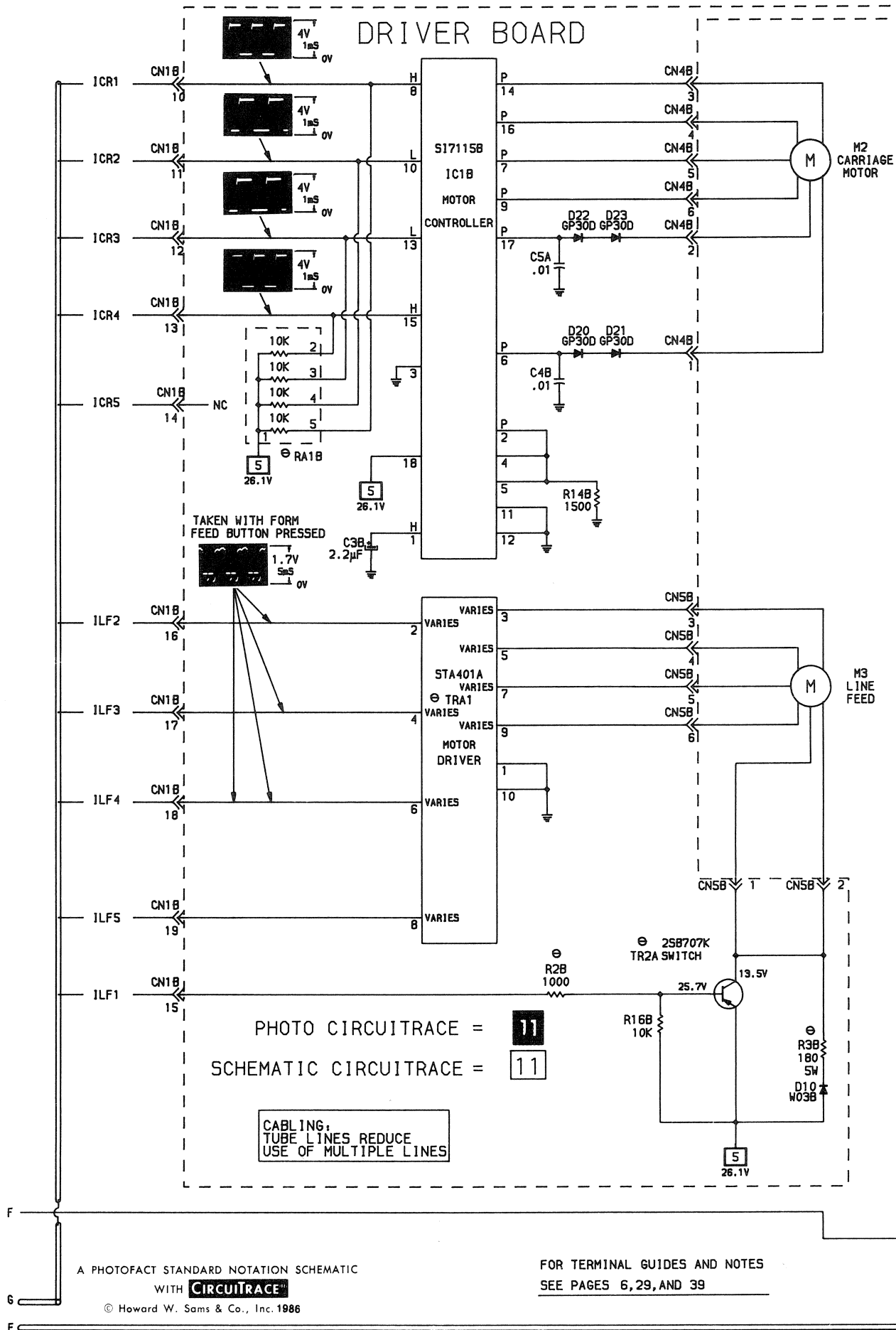
DRIVER BOARD



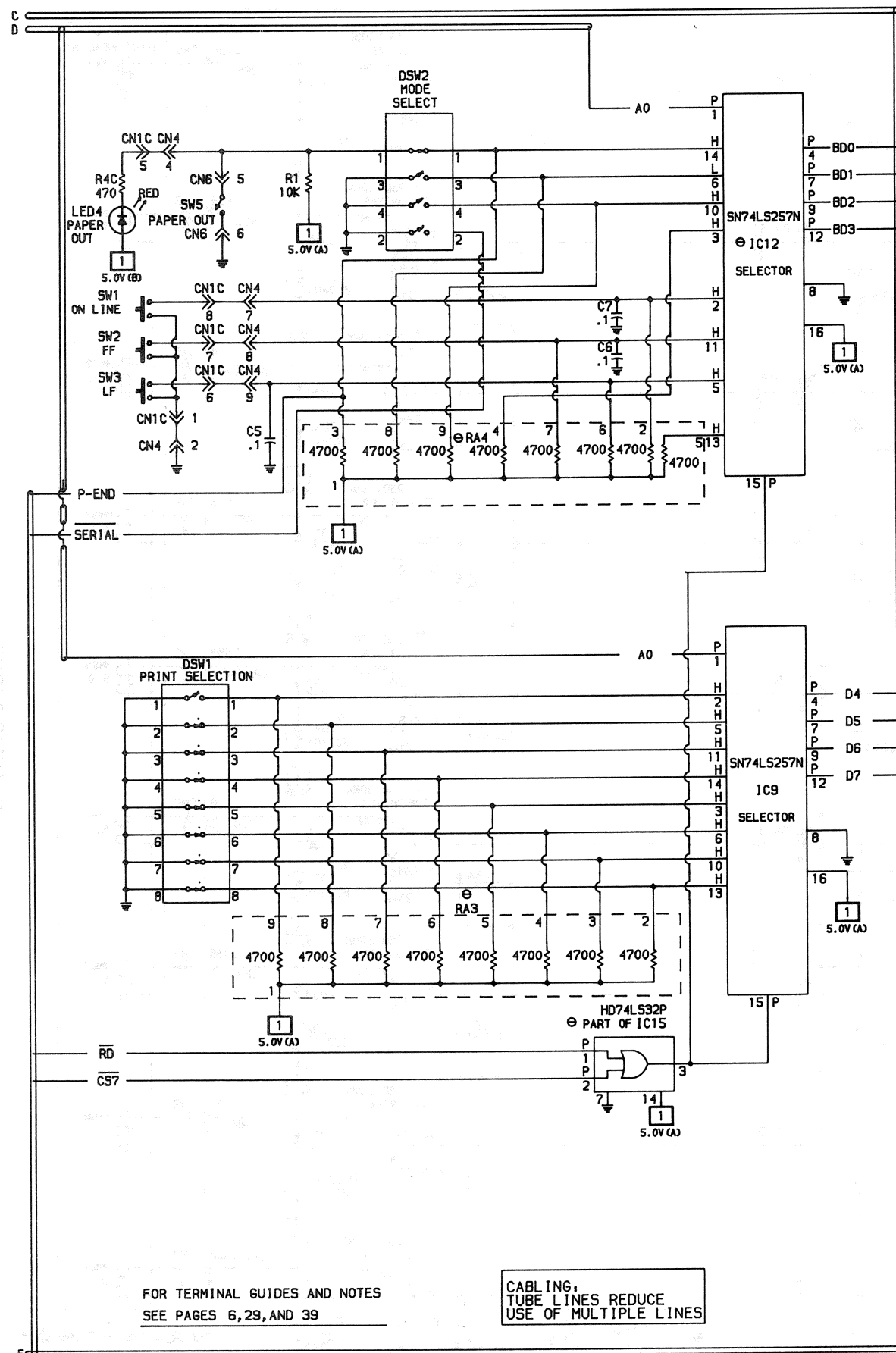
STAR
MODEL DELTA 10



DRIVER BOARD



MODEL DELTA 10

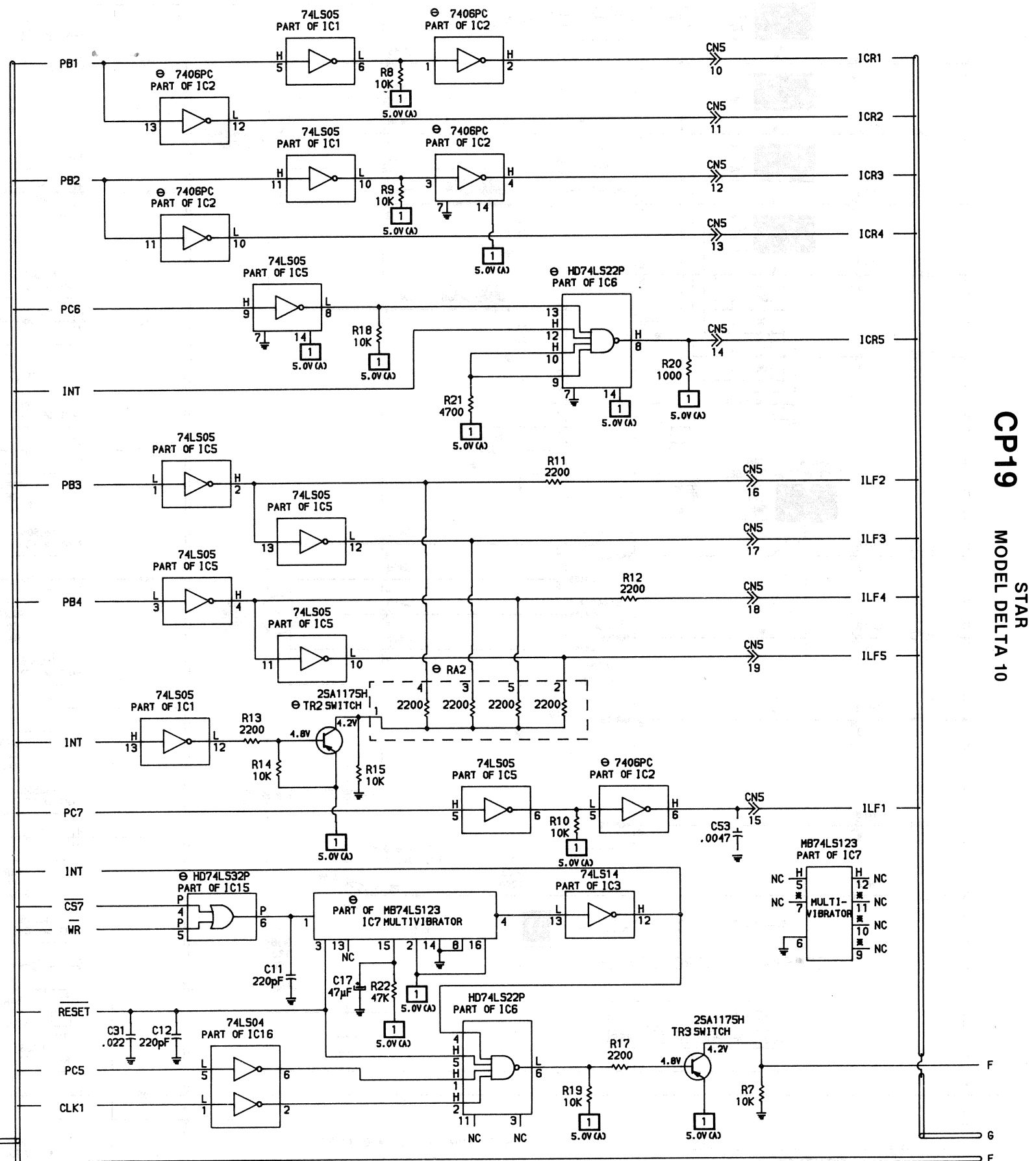


A PHOTOFACT STANDARD NOTATION SCHEMATIC

WITH **CIRCUITRACE™**

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MAIN CONTROL BOARD

CP19 STAR
MODEL DELTA 10

MAIN CONTROL BOARD

